WAVETEK

WAVETEK SAN DIEGO, INC.

9045 Balboa Ave., San Diego, CA 92123

INSTRUCTION MANUAL

MODEL 152-S-913
VARIPHASE GENERATOR

(Plus Option 001, Input Isolation; Model 581, HP2100 Interface; and Option 005, GPIB

NOTE

Option 001, 005 and Model 581 data are included in the rear of this manual.

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SAFETY

This instrument is wired for earth grounding via the facility power wiring. Do not bypass earth grounding with two wire extension cords, plug adapters, etc.

BEFORE PLUGGING IN the instrument, comply with installation instructions.

MAINTENANCE may require power on with the instrument covers removed. This should be done only by qualified personnel aware of the electrical hazards.

The instrument power receptacle is connected to the instrument safety earth terminal with a green/yellow wire. Do not alter this connection. (Reference: ⏚ or ⚠ stamped inside the rear panel near the safety earth terminal.)

WARNING notes call attention to possible injury or death hazards in subsequent operations.

CAUTION notes call attention to possible equipment damage in subsequent operations.

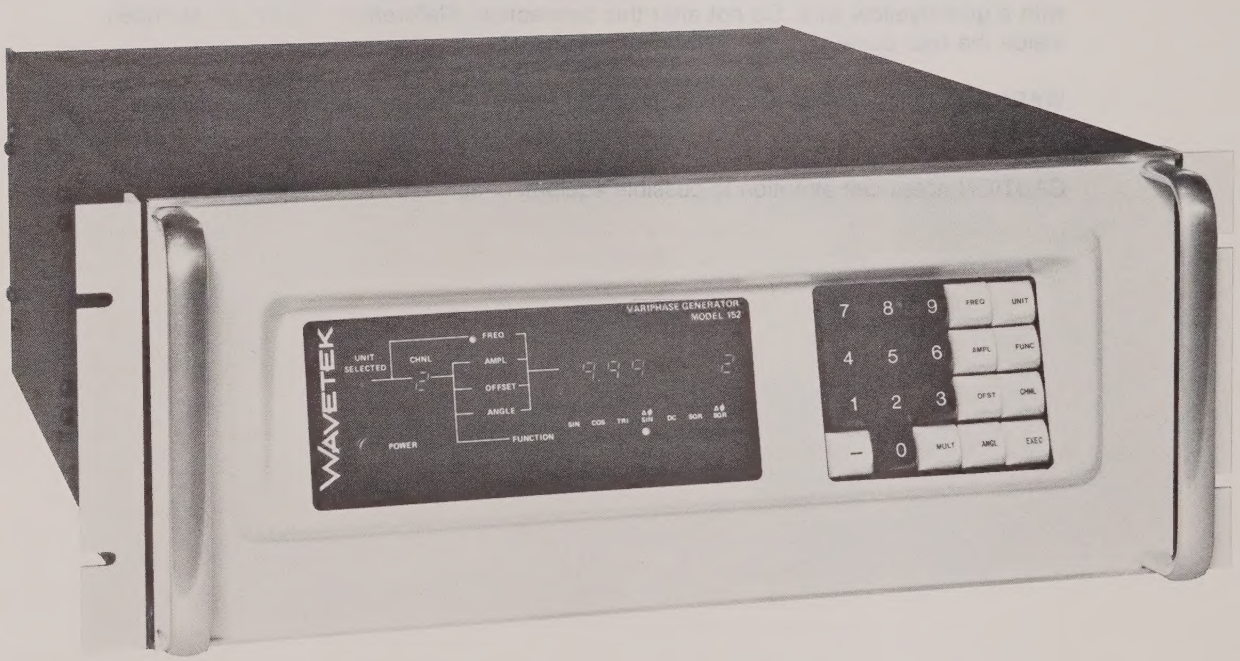


Figure i. Model 152 Variphase Generator

SECTION 1
INTRODUCTION

1.1 MODEL 152-S-913

The Model 152-S-913 is a two channel source of selectable carrier waveforms with variable phase relationship. Both channels provide suppressed carrier modulation (SCM) where the modulation signal is from an external low frequency source (1 Hz to 3 kHz). The carriers of both channels have the same frequency, and the phase relationship between the two carriers may be set at any desired angle.

The generator is digitally controlled locally with front panel keyboard pushbuttons, and remotely with a selection of 21 ASCII (7-level) "typing" characters (with appropriate external interface). The effect of each control is digitally displayed on the front panel with red LED (light emitting diode) indicators. Numeric readout of frequency, offset and amplitude is in 3-digit scientific notation. Phase angle is displayed in 4 digits.

Sine, cosine, triangle, square, variphase sine and variphase square carrier waveforms of frequencies from 1 Hz to 100 kHz plus dc and amplitudes from 10 mV peak to 9.99V peak can be generated.

Waveform center reference levels can be offset positive or negative from 10 mV to 9.99V and selected waveform phase, or polarity, can be inverted (180 degrees).

Along with the two low impedance (<1Ω, 100 mA maximum drive) rear panel outputs (CH 1 and CH 2), which are the controlled waveform signal outputs, the generator delivers a square wave of the selected frequency for a synchronizing pulse output (SYNC OUT).

A TTL input is received at the rear panel for external synchronization operation (SYNC IN).

An analog modulation signal must be applied to rear panel (AUX 1 and AUX 2) for SCM of CH 1 and CH 2, respectively.

Remote programming is accepted at a rear panel connector (EXT PROGRAM).

All programming (except phase angle) for one channel is stored in buffer registers while the other channel is being programmed. When the programming is completed, an EXECUTE command will transfer data from all the buffer registers to working registers, thus activating the digital to analog converters. In the case of phase angle programming, the phase angle program is accepted only for the last channel accessed.

Up to nine generators can be connected in parallel with one another as a multiple unit group. Each generator is internal-configured with its own address, or unit select code, from 1 to 9. For example, an installation may have one master display and keyboard panel, which is used to address and command the slave generators. The status of the addressed generator would be displayed.

1.2 INTERFACE

The generator accepts TTL ground true 7-bit ASCII "typing" characters serially; the 7 bits of each character are accepted in parallel. A clock line in parallel with the data bits is used to clock in the data characters. Computer control is accepted as is keyboard control from another generator in multiple unit groups. With computer control, the generator keyboard control panel can be locked out, or disabled, to prevent control competition.

1.3 OPTIONS

Several interface options are available. They include input isolation and proposed-IEC compatible and RS232 serial data converters.

1.4 ACCESSORIES

Accessories for the generators include interfaces for several mini-computers.

1.5 PHYSICAL DESCRIPTION

The mechanical characteristics of the Model 152 are given in paragraph 1.6.5. The standard model comes equipped with a 10 foot, 3 wire detachable power cord and rack

mount adapters. Interface cabling requires Molex brand connectors (see paragraph 2.2.3); one is furnished.

1.6 SPECIFICATIONS

Specifications apply for control settings from 1.00 to 9.99.

1.6.1 Versatility

Waveforms
Sine ∿, cosine ∨, triangle ∧, square ⎍, variphase sine, variphase square, and dc selectable. All waveforms except triangle and variphase sine may be inverted by changing the polarity of the peak amplitude programming.

Frequency Range
1 Hz to 100 kHz in 5 ranges with 3-digit resolution.

10^0	1 Hz to 9.99 Hz
10^1	10 Hz to 99.9 Hz
10^2	100 Hz to 999 Hz
10^3	1 kHz to 9.99 kHz
10^4	10 kHz to 99.9 kHz

Modulation Input (AUX 1 and AUX 2)
For a general 152 output, a –5.0 Vdc ±10 mVdc must be applied.
For an in-system SCM output, a 5.0 Vp ±10 mV sine wave between 1 Hz and 3 kHz must be applied.
Input impedance greater than 10 kΩ.

Main Outputs
The in-system 152-S-478 outputs are as follows:
±9.99 Vp SCM with a 500 Hz to 12 kHz carrier. Modulation is externally generated and applied through AUX 1 and AUX 2 inputs for channels 1 and 2, respectively.

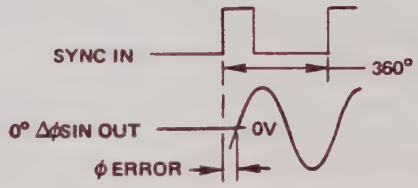
152 Outputs — General
DC voltage ±10 mV dc to ±9.99 Vdc. Sine, cosine, triangle, square, variphase sine and variphase square, 10 mV peak to 9.99V peak in 3 ranges (10^0, 10^1, 10^2). 100 mA peak maximum output current. Output impedance less than 1Ω. Outputs obtainable only with –5 Vdc ±10 mV on AUX 1 and AUX 2 inputs for channels 1 and 2, respectively.

Variable Phase
One channel of variphase (sine or square) may be varied with respect to another variphase channel (or sync input) from 0° to 360° with 0.1° resolution.

DC Offset
All waveforms may be offset 9.99V above or below ground level with 3-digit resolution and selectable polarity. Signal level plus offset voltage must not exceed ±9.99V peak.

Sync Output
The sync output is a TTL compatible square wave capable of sinking 13 mA for a fan-out of 8. This output is intended as a triggering source only, and has an unspecified phase relationship with the + SIN or 0° ΔϕSIN outputs.

Sync Input
The externally generated sync input must be a TTL compatible square wave capable of sinking 20 mA. The sync input circuit will provide a "frequency phase lock" between 152 and the sync input, providing the sync input frequency is within 1% of the 152 frequency. Synchronization operation will accurately align the leading edge of the sync input and the rising zero-crossing of the 0° ΔϕSIN carriers.
The input is terminated by 220Ω to +5V and 330Ω to ground. Open circuit voltage is +3V.



1.6.2 Accuracy

Horizontal Precision (Frequency Accuracy)
±(1% of program +0.1% of range) for 1 Hz to 10 kHz.
±(2% of program +0.1% of range) for 10 kHz to 100 kHz.

Vertical Precision
Defined with –5 Vdc ±10 mV on AUX 1 and AUX 2 inputs.
Square and Variphase Square Waveforms:
±(1% of program +0.1% of range) for 1 Hz to 10 kHz.
±(3% of program +0.1% of range) for 10 kHz to 100 kHz.
Sine, Cosine and Variphase Waveforms:
±(4% of program +0.1% of range) for 1 Hz to 10 kHz.
±(6% of program +0.1% of range) for 10 kHz to 100 kHz.
Triangle Waveform:
±(3% of program +0.1% of range) for 1 Hz to 10 kHz.

NOTE

Vertical precision stated is for 10^0 amplitude multiplier. For 10^1 and 10^2, add 2% per decade attenuation ±5 mV dc offset.

DC Offset
±(1% of program +0.1% of range).

Sine Wave Frequency Response
Amplitude Change With Frequency:
±0.3 dB to 10 kHz.
±0.5 dB to 100 kHz.

Phase Angle (Channel to Channel)
Channel 2 With Respect to Channel 1:
±0.3° to 1 kHz.
±1.0° to 10 kHz.
±4.0° to 100 kHz.

Phase Angle (Channel to SYNC IN)
Variphase Sine:
±1.0° for 500 Hz to 1 kHz.
±2.5° for 500 Hz to 12 kHz.
Variphase Square:
±1.5° for 500 Hz to 1 kHz.
±3.0° for 500 Hz to 12 kHz.

Amplitude Stability
Short Term: ±0.10% for 10 minutes with ±1°C change.

Phase Angle Stability
<.5° phase angle jitter for 500 Hz to 12 kHz.

Frequency Stability
Short Term: ±0.05% for 10 minutes.
Long Term: ±0.25% for 24 hours.

1.6.3 Purity

Sine Wave Distortion
Defined with −5 Vdc ±10 mV on AUX 1 and AUX 2 inputs.
Sine, Cosine, and ΔϕSIN Outputs:
Less than 1% total harmonic distortion for 1 Hz to 10 kHz.
Less than 2% total harmonic distortion for 10 kHz to 100 kHz.

Triangle Linearity
Greater than 99% to 10 kHz.

Square Wave Rise and Fall Time
Less than 3 μs for 20V p-p (6.7 V/μs)

Total Aberrations
Less than 5% of program value ±10 mV

Suppressed-Carrier Spectrum
Carrier frequency component in any SCM output > 30 dB down from either sideband.

1.6.4 Environmental

Specifications apply for 25°C ±5°C. For operation from 0°C to +50°C, derate all specifications by a factor of 2. Unit may be stored from −40°C to +75°C without damage.

1.6.5 Mechanical

May be used on the bench or in a 19-inch rack. Rack adapter hardware and program mating connectors included.

Dimensions
17¼ in./43.8 cm wide, 7 in./17.8 cm high, 23½ in./59.7 cm deep.

Weight
43 lb/19.5 kg net, 52 lb/23.6 kg shipping

Power
90V to 110V, 105V to 125V, 180V to 220V, or 210V to 250V; 50 Hz to 400 Hz. Less than 150 watts.

Programming Transition Time
Unit accepts bytes at a 1 MHz rate (10 kHz rate for optical isolation). The output will become stable within 100 μs unless frequency, frequency range or phase angle is changed. For frequency and frequency range, the output will be stable within 1 ms. For phase angle, the output will be stable within 10 ms after receiving the next program prefix (e.g. A for amplitude).

Isolation
Signal ground is isolated from program ground in the 152-S-478 via option 001.

Logic Level Requirements

State	Requirements
Low (Logic "1")	0V to 0.4V sinking 25 mA maximum
High (Logic "0")	2.4V or open

NOTE

1. *Open input is 3.0V.*
2. *Input is terminated by 220Ω to +5V and 330Ω to ground.*
3. *Recommended driver: SN 7438.*

SECTION 2
INSTALLATION AND OPERATION

2.1 MECHANICAL INSTALLATION

After unpacking the instrument, visually inspect all external parts for possible damage to connectors, surface areas, etc. If damage is discovered, file a claim with the carrier who transported the unit. The shipping container and packing material should be saved in case reshipment is required.

The standard generator is a bench-top instrument with a collapsible tilt-bail to elevate its front end for convenient viewing.

The generator has rack mount adapters on the sides. For convenience, we recommend that users purchase a pair of chassis slides when rack mounting.

2.2 ELECTRICAL INSTALLATION

2.2.1 Power Connection

NOTE

Unless otherwise specified at the time of purchase, this instrument was shipped from the factory with the power transformer connected for operation on a 105 - 125 Vac line supply and with a 1½ amp slow-blow fuse.

Conversion for 90 to 110V, 180 to 220V or 210 to 250V operation requires resetting two switches on the rear panel. Set the two switches and select the fuse for the ac line voltage according to the following table.

AC Line Voltage	Switch A	Switch B	Fuse (SB)
90 - 110	115	LO	1½ amp
105 - 125	115	HI	1½ amp
180 - 220	230	LO	¾ amp
210 - 250	230	HI	¾ amp

Connect the ac line cord to the mating connector at the rear of the unit.

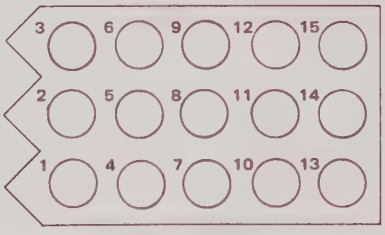
2.2.2 Signal Connections

Use 50Ω shielded cables equipped with female BNC connectors to distribute CH outputs, SYNC OUT and SYNC IN signals when connecting this instrument to associated equipment.

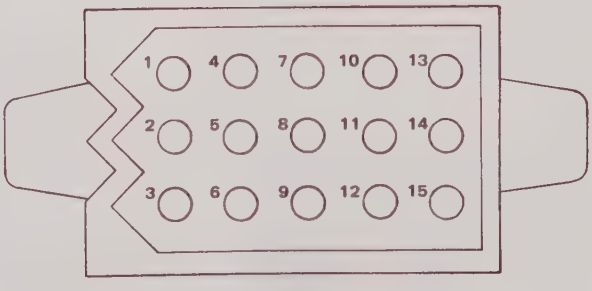
2.2.3 Control Connections

The remote (ASCII DATA IN/OUT) rear panel connection, harness wire colors, pin connections and signal names are given in tables 2-1 and 2-2.

The remote connector is a Molex 03-09-1151 which mates with a Molex 03-09-2151 connector housing with up to 15 Molex 02-09-2118 pin contacts. Pin contacts are prepared using a Molex Model A6973 Crimping Tool to connect No. 18 or No. 22 wire (strip back 1/10 to 1/8 inch).



MOLEX 03-09-1151



MOLEX 03-09-2151

Figure 2-1. Connectors (Socket/Pin Sides)

Table 2-1. ASCII DATA IN/OUT AND HARNESS CONNECTORS

	Connector					
	ASCII Data In/Out (Rear Panel)		Keyboard Harness		Display Harness	
Pin	Wire Color	Signal	Wire Color	Signal	Wire Color	Signal
1	1	PCOM				
2	2					
3	3	KINH	2	KINH		
4			1	+5V	7	+5V
5	5	GND				
6	6	BUSY				
7	7	COM	91	COM	0	COM
8	8	XD2	8	KD2	1	DCLK
9	9	XD4	5	KD4		
10	90	XD3	3	KD3	2	DD0
11	91	XD1	7	KD1	4	DD2
12	92	XD5	4	KD5		
13	93	XD0	90	KD0	6	DSYNC
14	94	XD6	6	KD6	3	DD3
15	95	XCLK	9	KCLK	5	DD1

Code	Color	Code	Color
0	Black	8	Gray
1	Brown	9	White
2	Red	90	White with black tracer
3	Orange	91	White with brown tracer
4	Yellow	92	White with red tracer
5	Green	93	White with orange tracer
6	Blue	94	White with yellow tracer
7	Violet	95	White with green tracer

PCOM: Input Program Common (connected to signal common unless isolation configuration)
KINH: Keyboard Inhibit
GND: Safety Ground
BUSY: Not Ready for New Data
COM: Signal Common or Keyboard Ground
X: External
D: Data
0 - 6: Bits 0 thru 6
CLK: Clock
K: Keyboard
D: Display

True = Low
False = High
TTL Voltage Level

Table 2-2. KEY, ASCII, HEXADECIMAL AND BINARY CODES FOR PROGRAMMING FUNCTIONS

Control and Data Names	Model 152 Key	ASCII Character and TTY Keyboard	Hexa-Decimal Code	Binary (and ASCII Bus) XD6 Bit 7	XD5 Bit 6	XD4 Bit 5	XD3 Bit 4	XD2 Bit 3	XD1 Bit 2	XD0 Bit 1
Range (X 10 mult)*		(Space)	20	0	1	0	0	0	0	0
Invert phase/offset	CHS	–	2D	0	1	0	1	1	0	1
0	0	0	30	0	1	1	0	0	0	0
1	1	1	31	0	1	1	0	0	0	1
2	2	2	32	0	1	1	0	0	1	0
3	3	3	33	0	1	1	0	0	1	1
4	4	4	34	0	1	1	0	1	0	0
5	5	5	35	0	1	1	0	1	0	1
6	6	6	36	0	1	1	0	1	1	0
7	7	7	37	0	1	1	0	1	1	1
8	8	8	38	0	1	1	1	0	0	0
9	9	9	39	0	1	1	1	0	0	1
Peak amplitude	AMPL	A	41	1	0	0	0	0	0	1
Output channel	CHNL	B	42	1	0	0	0	0	1	0
Function (waveform)	FUNC	C	43	1	0	0	0	0	1	1
Reference offset	OFST	D	44	1	0	0	0	1	0	0
Range (X 10 mult)*	MULT	E	45	1	0	0	0	1	0	1
Frequency	FREQ	F	46	1	0	0	0	1	1	0
Unit select address	UNIT	G	47	1	0	0	0	1	1	1
Phase angle	ANGL	H	48	1	0	0	1	0	0	0
Execute	EXEC	I	49	1	0	0	1	0	0	1

1 = True = Low
0 = False = High
TTL Voltage Level

*See the second entry of this control name.

2.2.4 Isolation and Keyboard Inhibit

The Model 152 may be controlled by a remote controller whose system ground reference is separated from the instrument signal common. With this isolation, the input program common remains separated from the instrument signal common. Most options include isolation; option 152-001 is the isolation only option. The optical isolators used provide up to 1500 volts of signal isolation. (Optical isolation reduces character programming rate to 10 kHz.)

Frame ground is connected to the instrument chassis and the third (green wire) pin on the power plug.

To disable the Model 152 keyboard, the keyboard inhibit line must be connected to the signal common. With most options, a programmable relay for disabling is provided to ensure isolation. The keyboard inhibit line nominal open circuit voltage is 3 volts with respect to signal common.

SECTION 3
OPERATION

3.1 INITIAL CHECKOUT

Model 152-S-913 is operated only as outlined in paragraph 1.6.1, Main Outputs. Out-of-system checkout and operation can be accomplished by injecting –5 Vdc ±10 mV into the AUX 1 and AUX 2 BNCs. Some specifications are necessarily derated from the standard 152.

To ensure that the generator is operating properly, make the power and interface connections (Section 2). Operate the generator, function-by-function, as described in the following paragraphs.

3.2 CONTROLS, INDICATORS AND PROGRAMMING

The generator has a 20 pushbutton front panel keyboard to provide the same control as the 20 remotely programmed ASCII character bytes.

The 20 generator controls and their various code conversions are listed in table 2-2. The generator front panel controls and indicators are shown in figure 3-1.

3.2.1 Power

Power is turned on and off with the PWR pushbutton. When the power is turned on, the generator is automatically addressed and is ready to accept commands. If a different generator is to be addressed, use the UNIT control (refer to paragraph 3.2.4). Also, when the power comes on, the generator is in standby state until properly programmed. While in this state, the display may show improper indications.

3.2.2 Indicators

The indicators turn on to show the various functions, values, sign, and address programmed; the numerals displayed are significant as frequency, amplitude, phase angle or offset, but only one category at any one time. For frequency, amplitude and offset, scientific notation is displayed. (Scientific notation is ().()() (), where the first three () are significant digits and the last () is a power of ten, a multiplier.) For phase angle, a 3-digit whole number and a 1-digit decimal is displayed.

The digits are displayed in the order of entry, shifting right-to-left as shown in table 3-1. (Only the last entered set of significant digits and the last entered digit for the power of ten are stored for any given address, such as function, amplitude, etc. Any previously entered digits are shifted out of memory.)

Table 3-1. EXAMPLE OF PROGRAMMING

Sequence	Wavetek Keyboard	Remote ASCII	Lighted Display
1	UNIT	G	–
2	1	1	UNIT SELECTED
3	FREQ	F	FREQ
4	5	5	0.05
5	7	7	0.57
6	9	9	5.79
7	MULT	E	–
8	3	3	3 (Power of Ten)
9	CHNL	B	–
10	1	1	CHNL 1
11	FUNC	C	–
12	0	0	SIN
13	AMPL	A	AMPL
14	5	5	0.05
15	0	0	0.50
16	0	0	5.00
17	MULT	E	–
18	0	0	0 (Power of Ten)
19	EXEC	I	–

Note: The output signal will not appear until "EXEC" is commanded.

3.2.3 Programming

Programming is mostly a matter of prefixing, by sequence, the numerical values and numeric codes with their intended use. For example, programming a 5.79 kHz, 5.00V peak sine wave on Channel 1 of Unit No. 1 is given in table 3-1.

A graphical representation of programming the 152 is shown in figure 3-1, where each programmed character allows further access into a branching network or allows an exit from one branch and an entrance to another. The example in table 3-1 applied to figure 3-1 shows how programming G1, or pressing the UNIT and the 1 keyboard keys, gains access to the "Model 152" branch. Programming F, or pressing the FREQ key, gives access to the frequency branch of the Model 152. After the values of frequency are programmed, another branch is selected, etc., until the 152 is programmed as desired. The EXEC key, or programmed I, transfers the programmed, or keyed, data into D-to-A converters for an actual generator output.

NOTE

Any character may be separated by spaces, periods or other characters not defined here. Spaces may be inserted between alpha control characters and numeric fields; however, a space will move from a value field to the exponent field (where scientific notation is used) after at least one numeric digit has been received. (See paragraphs 3.2.6 and 3.2.7)

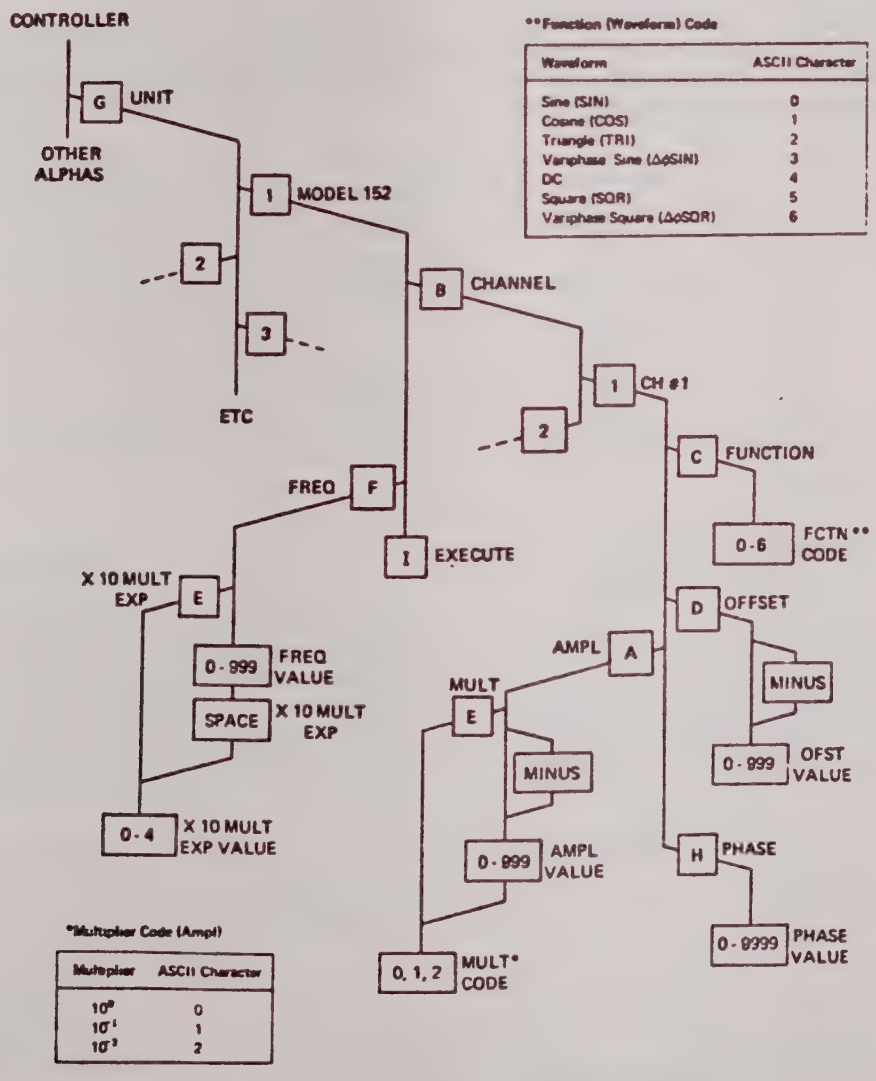


Figure 3-1. Programming Branch Network

The 152 generates a busy signal while calculating sine and cosine values. The channel number cannot be changed while the busy signal is asserted.

If a phase angle value is followed by an execute, all registers except phase will be updated immediately and phase angles will be updated 1 to 2 ms later when the sine calculator provides the values.

The generators are designed to accept a scientific notation input format. System programmers using FORTRAN will find that the result of the format statement

20 FORMAT (1 HF, 1PE13.3)

will control the frequency without additional processing.

The following paragraphs describe the program elements and give their ASCII codes. The Model 152 front panel keys correspond one-for-one with the ASCII codes; if there is any doubt as to correspondence, refer to table 3-2.

Table 3-2. KEYBOARD TO ASCII CONVERSION TABLE

Keyboard	ASCII	Keyboard	ASCII
AMPL	A	MULT	(Space) or E
UNIT	G	ANGL	H
OFST	D	EXEC	I
CHNL	B	0 thru 9	0 thru 9
FUNC	C	CHS	– (Minus)
FREQ	F		

3.2.4 Unit Selected Address

After the unit prefix (G), program one digit to select the unit. The unit addressed in a multiple unit group responds to subsequent commands; other units do not. Generators are given the address of 1 at the factory unless specified otherwise at the time of purchase. Address changes are easily made in the field. Subsequent instructions will be accepted by the last unit addressed.

3.2.5 Function (Waveform)

Waveform	ASCII Character
Sine (SIN)	0
Cosine (COS)	1
Triangle (TRI)	2
Variphase sine (ΔϕSIN)	3
DC	4
Square (SQR)	5
Variphase square (ΔϕSQR)	6

After the function prefix (C), program one digit to select the desired waveform or DC voltage. Waveforms or DC voltage can be inverted during amplitude selection.

3.2.6 Frequency and Multiplier

After the frequency prefix (F), program a 3-digit number (1.00 to 9.99) for the three most significant digits; after the multiplier prefix (E or space), program the power of 10 (0 thru 5).

3.2.7 Amplitude and Multiplier

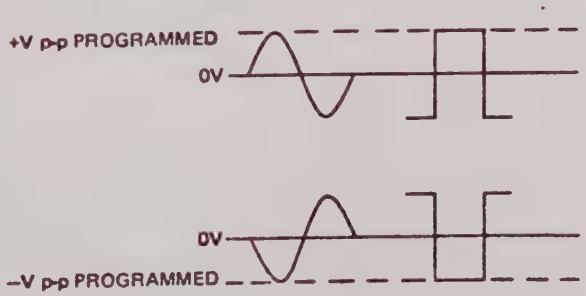
After the amplitude prefix (A), program (–) if waveform inversion is desired (triangle and variphase sin cannot be inverted); then, program a 3-digit number (0.00 to 9.99) for the three most significant digits. After the multiplier prefix (E or space), program the power of 10 (0, 1 or 2). Powers 1 and 2 are automatically accepted as –1 and –2. Amplitude programmed is peak voltage.

Function	Inversion
SIN	Yes
COS	Yes
TRI	No
ΔϕSIN	No
DC	Yes
SQR	Yes
ΔϕSQR	Yes

NOTE

DC offset plus waveform peak value may not exceed 100 mA peak load current.

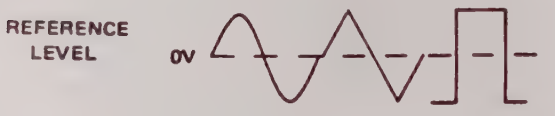
All waveforms have a center reference level. Notice the inversion caused by programming –V peak. Normal waveforms start in the positive direction regardless of their offset. Inverted waveforms start in the negative direction regardless of their offset.



3.2.8 Signal Reference Offset

After the offset prefix (D), program (–) if negative offset is desired; then, program a 3-digit number (0.00 to 9.99) for the offset.

Offset control allows the generator output reference level to be offset, or displaced positive or negative to 10V. All waveforms have a center reference level from which the offset is made.



NOTE

DC offset plus waveform peak value may not exceed 10V peak into an open circuit or 5V peak into 50Ω.

3.2.9 Phase Angle

After the phase angle prefix (H) program a 4-digit number (000.0 to 359.9) to change the phase angle of the channel programmed.

3.2.10 Execute

Programming execute (I) enables the output by transferring data from the program buffer to the working buffer.

NOTE

All the programs required for all the available channels can be stacked before executing the transfer.

3.3 OPERATING PROCEDURE

No preparation for operation is required beyond the completion of the initial installation checks. Allow the generator and associated equipment to warm up for specified generator accuracies. Refer to the control descriptions given in paragraph 3.2 for actual keyboard or remote commands.

NOTE

Use the same length of RG58 for both Channel 1 and Channel 2 cables.

3.3.1 Operating as a Basic Waveform Generator

Simply program the desired waveform, frequency, amplitude and offset for each channel.

3.3.2 Operating as a DC Voltage Source

DC voltage output is ±10V, 100 mA obtained by using the DC function.

1. Select DC function.
2. Program the desired voltage and polarity.

3.3.3 Operating as a Variphase Generator

An output is phase shifted with respect to the sync output, sync input from another source or with respect to the other output channel.

NOTE

The accuracy of phase angle is defined between two variphase-sine or square selected channels only.

1. Connect external sync if desired.
2. Program the desired waveform, frequency, amplitude and offset. (If external sync is used, sync and program frequencies must be within 1%. The waveform for the phase shifted channel must be either variphase sine or variphase square.)
3. Program the desired phase angle for the channel with the variphase waveform.

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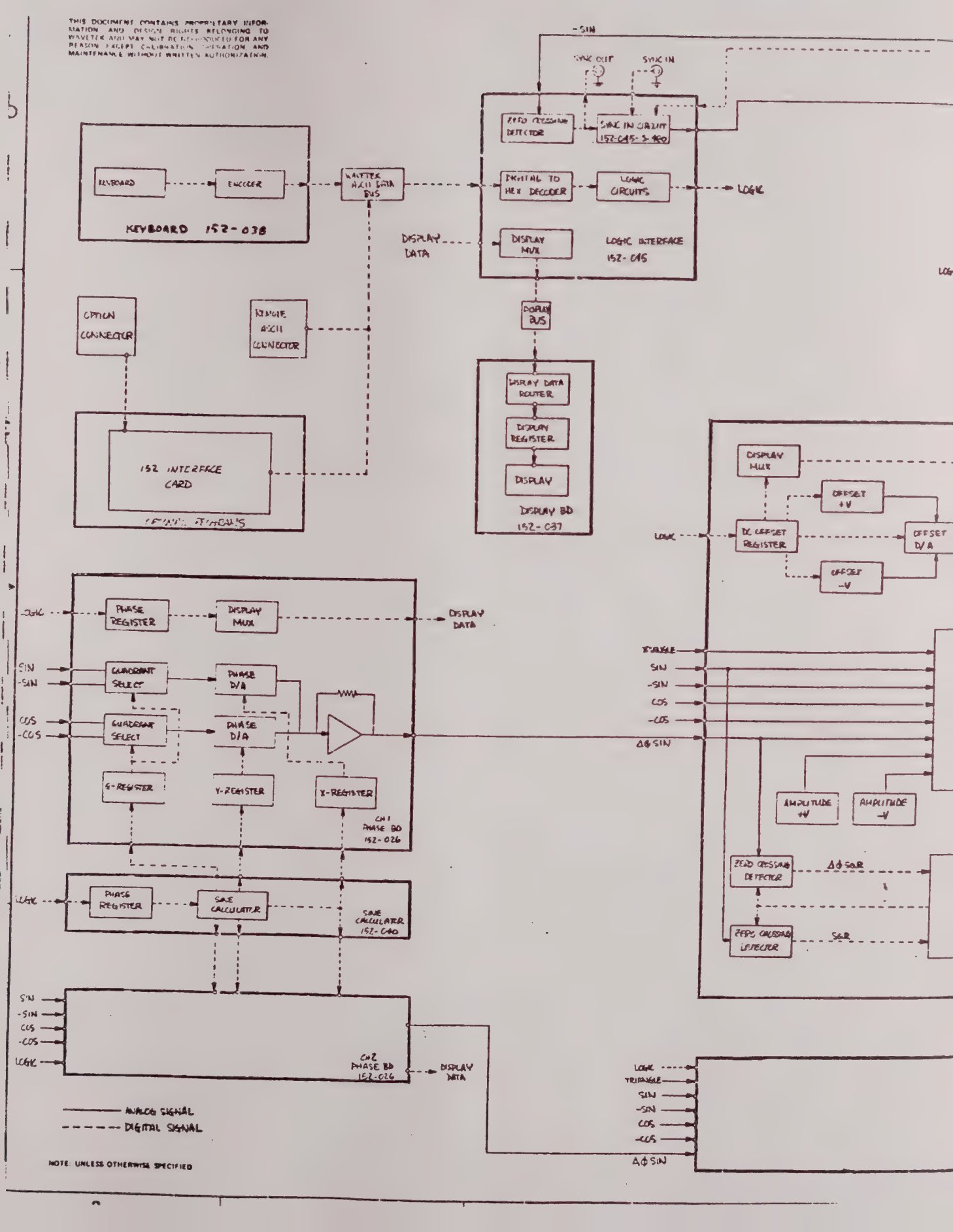

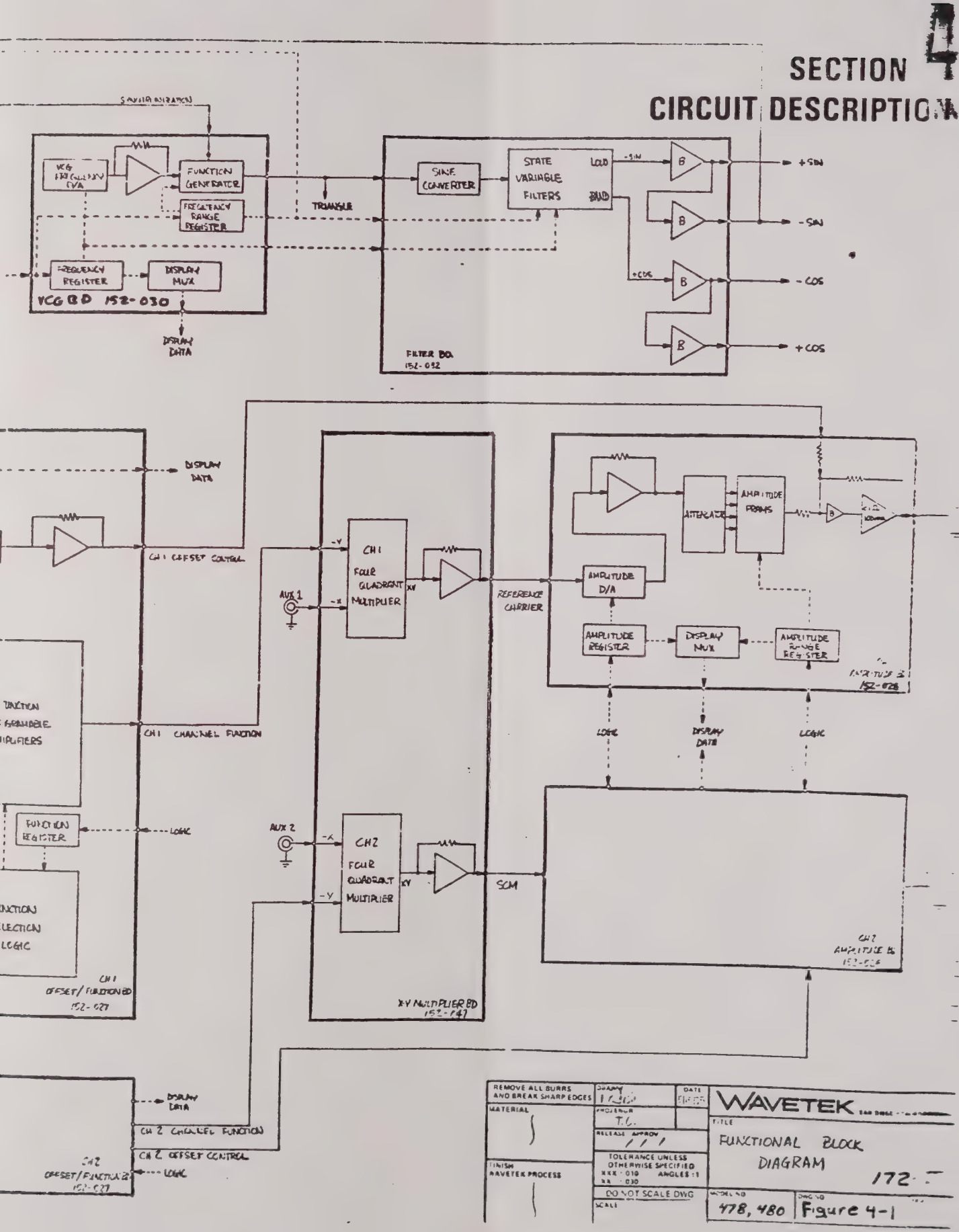

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK
MATERIAL	ENGINEER T.C.		TITLE FUNCTIONAL BLOCK DIAGRAM 172
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 478, 480
	SCALE		DWG NO Figure 4-1

SECTION 4
CIRCUIT DESCRIPTION

4.1 LOGIC NOTATION AND TERMINOLOGY

To avoid confusion in determining logic states, please read and understand the following ground rules used in this manual.

1. On the schematics, all signals are true-when-high unless their mnemonics are overscored; the overscore indicates true-when-low.

2. Pulse and clock refer to transient change of state, whereas status refers to a logic state which requires new input to change.

4.2 BASIC OPERATION

The overall operation can be easily followed in figure 4-1. All digital programmed ASCII data, via the keyboard, the remote ASCII connector or optional interface card, is decoded into hexadecimal data on the logic interface board. The data is then distributed throughout the logic control circuitry to program all of the holding registers which control the operation of the generator. The generator frequency can be phase locked to an external source through the SYNC IN BNC connector. The SYNC OUT provides TTL compatible waveforms used for triggering purposes. The logic interface board also includes the data multiplexing circuitry for the display data. The display data is multiplexed into the display bus for display panel illumination. The routing of the correct data to the correct display is determined by a clock pulse and sync pulse on this bus.

The function generator generates symmetrical triangle and square waveforms simultaneously. Since this is a voltage controlled generator, the integrating current, frequency, is easily controlled with a D/A. The frequency range register selects the range integrating capacitor.

The triangle is fed to the filter board where it is shaped into a sine wave by diode nonlinearity. The state variable filter creates a sine/cosine relationship by using a frequency tracking bandpass and low pass filter. The filter outputs are buffered and inverted to create the quadrature components of the sinusoidal waveform..

To control the phase angle of the variphase sine wave, a fundamental trigonometric identity is used, $\sin(\omega t + \theta) = \cos\theta \sin\omega t + \sin\theta \cos\omega t$, where $\sin(\omega t + \theta)$ is an expression of relative signal amplitude of between 1 and -1 at time t when starting at angle θ. $\sin\omega t$ and $\cos\omega t$ are the sine and cosine functions created by the state-variable filter where $\omega = 2\pi$ frequency. $\sin\theta$ and $\cos\theta$ are computed at the sine calculator board from the program phase angle θ. These computed values are transferred to the phase board where they are multiplied by $\sin\omega t$ and $\cos\omega t$ with the phase D/As. The phase D/A outputs are summed to create the $\sin(\omega t + \theta)$ variphase sine wave and then transferred to the offset/function board.

Zero crossing detectors are used to create a variphase square wave and square wave from the variphase sine wave and sine wave, respectively. The square and variphase square wave, through the function select logic, control the ±V amplitude inputs of the programmable amplifiers to produce the same waveform at the programmable amplifiers output. The function selection logic selects one of six waveforms on the output of the programmable amplifiers.

This output is fed into one input (−Y) of the X-Y multiplier and the external AUX input is fed into the other input (−X The output from the X-Y multiplier is directly proportional to the product of these two inputs. In the in-system 152-S-478, this waveform will be a Suppressed Carrier Modulated (SCM) signal. This SCM signal is attenuated via the amplitude D/A and summing amplifier. The signal is then decade-attenuated with a programmable amplifier before being fed into an output amplifier. The offset voltage from the offset D/A (function/offset board) is also injected at this summing node. The output amplifier consists of a fast differential input amplifier and a high current gain amplifier to provide $<1\Omega$ output impedance and 100 mA maximum current capabilities.

SECTION 5
CALIBRATION

5.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

5.2 REQUIRED TEST EQUIPMENT

DVM
Oscilloscope, Dual Channel With Comparator and Differential Inputs
Counter
Distortion Analyzer
Spectrum Analyzer, HP3580A or equivalent

5.3 CALIBRATION

After referring to the following preliminary data, perform calibration, as necessary, per table 5-1. If performing partial calibration, check previous settings and adjustments for applicability.

1. Refer to appropriate board assembly drawings for test point and adjustment locations.

2. TPs (Test Points) and adjustments are prefixed as follows:

A1	Power Supply
A2	VCG Board
A3	Filter Board
A4	Channel 1 Phase Board
A5	Channel 2 Phase Board
A6	Channel 1 Offset/Function Board
A7	Channel 2 Offset/Function Board
A8	X-Y Multiplier Board
A9	Channel 1 Amplitude Board
A10	Channel 2 Amplitude Board
A11	Logic Interface/Sync Circuit

3. Before connecting the unit to an ac source, check the ac line circuit to make sure the 115/230 and HI LO switches are set at the correct position (see paragraph 2.2.1).

4. Start the calibration by executing the following program:

Frequency	9.99E2
Channel	1
Amplitude	9.99E0
Offset	0.00
Function	0
Angle	045.0
Execute	
Channel	2
Amplitude	9.99E0
Offset	0.00
Function	0
Angle	0
Execute	

5. Allow the unit to warm-up at least 30 minutes prior to final calibration.

6. Dotted lines in table 5-1 indicate data from previous step remains applicable.

Table 5-1. CALIBRATION CHART

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
1	Power supply regulation	DVM	Across A2C2 (neg side to DVM com)	See initial conditions	A1R28	+15 Vdc ±10 mV	Put VCG bd on ex-tender.
2			Across A2C4 (pos side to DVM com)		NA	−15V reading same as +15V reading ±5 mV	
3			Across A1C8 (6000 μF) (neg terminal to DVM com)		A1R2 P/S	+5.020 Vdc ±5 mV	
4	Square wave time sym	Scope	A2TP6 VCG BD		A2R55	Horiz (time) sym error <0.1%	
5				Freq 1.00E3	A2R66		Repeat steps 4 and 5, as necessary, for cor-rect adjustment.
6	Freq tracking	Counter	CH 1 BNC	Freq 9.99E3	A2R10	9.99 kHz	Input −5.00 Vdc to AUX 1 and AUX 2.
7				Freq 1.00E3	A2R34 32	1.00 kHz	Repeat steps 6 and 7, as necessary for cor-rect adjustment.
8	Freq linearity			Freq 9.99E0	A2R10	9.99 Hz	
9				Freq 9.99E1		99.9 Hz	
10				Freq 9.99E2		999 Hz	
11				Freq 9.99E3		9.99 kHz	Leave A2R10 at best freq agreement on these ranges.
12				Freq 9.99E4	A2C41	99.5 kHz	
13				Freq 1.00E4 thru 9.99E4 in 2.25 in-crements		Best linearity	

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
	Replace VCG board and put filter board on extender. Ensure that no external sync cable is connected to scope.						
14	Distortion	Scope (differential input)	A3 1V SINE TP FILTER BD	Freq 9.99E2	A3R22 A3R23	±0.5V peaks ±2 mV	
15		Distortion analyzer			A3R2 A3R22	Lowest distortion with smooth residue (minimum 2nd harmonic)	Distortion typically <0.25%.
16		Scope (differential input)			A3R23	1.00V p-p ±4 mV	
17	Filter balance		A3C37 (sin)	Freq 1.00E3	A3R60	No dc offset	Connect scope probe to front side of capacitor.
18				Freq 1.09E3	A3R114		
19				Freq 1.90E3	A3R113		
20			A3C44 (cos)	Freq 1.00E3	A3R52		
21				Freq 1.09E3	A3R64		
22				Freq 1.90E3	A3R55		
23				Freq 9.99E3		<10 mV offset	If >10 mV, repeat steps 17 - 23
24			A3C37 (sin)				
25	Filter buffers		A3 +SINE TP	Freq 8.00E2	A3R30 A3R110	±5.000 Vp ±5 mV	Connect scope probe to test point.
26			A3 –SINE TP		A3R112		
27			A3 ±COS TP		A3R29 A3R106		
28			A3 +COS TP		A3R108		
29	Filters freq E4 balance		A3 +SINE TP A3 –COS TP	Freq 5.00E4	A3C41	+sin and –cos amplitudes = ±20 mV	Ensure scope probe is properly compensated for HF measurements.

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
30	Filters freq E4 balance	Scope (differential input)	A3 +SINE TP A3 –COS TP	Freq 5.00E4	A3C48 A3R25	+sin and –cos amplitudes ±5.000V ±20 mV peak	*NOTE: A3C48 balances the filters to the program freq. A3R25 acts only as an absolute amplitude control and is useful in balancing out the freq E4 range.* Repeat steps 29 and 30, as necessary, for proper calibration.
31				Freq 9.99E4		±5.00V ±100 mV peak +sin and –cos	If tolerance is met, skip step 32.
32					A3R25		Repeat steps 30, 31 and 32 until +sin and –cos amplitudes track within ±100 mV of ±5V from freq 1.00E4 thru 9.99E4.
33	CH 1 phase		A4TP1 CH1 PHASE BD	Freq 8.00E2	A4R1 A4R2	±5.000 Vp ±5 mV	Replace filter board and put channel 1 phase board on extender.
34	CH 2 phase		A5TP1 CH 2 PHASE BD		A5R1 A5R2		Replace channel 1 phase board and put channel 2 phase board on extender
35	CH 1 offset	DVM	A6TP1 CH1 OFFSET/FUNC	CH 1 Func 4 Ampl 0.00E0 Ofst 9.99	A6R3	–9.99 Vdc	Replace channel 2 phase board and put channel 1 ofst/func board on extender
36				Ofst –9.99	A6R4	+9.99 Vdc	Program – key.
37	CH 1 amplitude		A8TP5 X-Y BD	Func 5 Freq 0.50E0 Ampl 9.99E0 Ofst 0.00	A6R2 A6R1	+9.99V +peak –9.99V –peak	

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
38	CH 2 offset	DVM	A7TP1 CH2 OFFSET/FUNC	CH 2 Func 4 Ampl 0.00E0 Ofst 9.99	A7R3	–9.99 Vdc	Replace channel 1 ofst/func board and put channel 2 ofst/ func board on extender.
39				Ofst –9.99	A7R4	+9.99 Vdc	
40	CH 2 amplitude		A8TP3 X-Y	Func 5 Ampl 9.99E0 Ofst 0.00	A7R2 A7R1	+9.99V +peak –9.99V –peak	
41	CH 1 X-Y modulated carrier	Scope (trig from 152 SYNC OUT)	A8TP15	CH 1 Freq 9.60E3 Ampl 9.99E0 Ofst 0.00 Func 2	A8R14 A8R10	Linear 20 mV triangle	Input ±5.00 Vdc 800 Hz sine wave (no dc ofst) at AUX 1. Replace channel 2 ofst/func board and put X-Y multiplier board on extender. clip jumper between A8TP16 and A8TP10. While varying A8R10 for approx 20 mV triangle on either side of null, set A8R14 for minimum wave.
42					A8R14	Null	
43		Scope (trig from AUX 1)			A8R15	Minimum amplitude signal	Move jumper from A8TP12 to A8TP10.
44				Func 5	A8R13 A8R21	±9.99V peaks	Remove jumper. Input –5.00 Vdc to AUX 1.
45	CH 2 X-Y modulated carrier	Scope (trig from 152 SYNC OUT)	A8TP14	CH 2 Freq 9.60E3 Ampl 9.99E0 Ofst 0.00 Func 2	A8R32 A8R36	Linear 20 mV triangle	Input ±5.00 Vdc 800 Hz sine wave (no dc ofst) at AUX 2. Clip jumper between A8TP16 and A8TP10. Adjust A8R36 for approx 20 mV triangle on either side of null and adjust A8R32 for minimum wave.
46					A8R36	Null	
47		Scope (trig from AUX 2			A8R37	Minimum amplitude signal	Move jumper from A8TP10 to A8TP8.

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
48				Func 5	A8R35 A8R32 43	±9.99V peaks	Remove jumper. Input –5.00 Vdc at AUX 2.
49	CH 1 output ampl	DVM	CH 1 BNC	CH 1 Freq 0.50E0 Ampl 0.00E3 Ofst 0.00 Func 4	A9R59 CH1 AMPL BD	0.00 Vdc ±5 mV	Replace X-Y mult board and put channel 1 ampl board on extender.
50				Ampl 0.00E2	A9R55		
51				Ampl 0.00E1	A9R69		
52				Ampl 0.00E0	A9R65		
53		Scope (differential input)		Freq 8.00E2 Ampl 9.99E0 Func 5	A9R78	±9.99 Vp square wave	Set A9R78 so that the ± peak amplitudes give a magnitude of ±9.99 Vp.
54	CH 1 output offset	DVM		Ampl 0.00E0 Ofst 9.99	A9R81	9.99 Vdc ±5 mV	
55				Ofst –9.99		–9.99 Vdc ±10 mV	A9R81 may be reset for best results between ±ofst.
56	CH 2 output ampl	DVM	CH 2 BNC	CH 2 Ampl 0.00E3 Ofst 0.00 Func 4	A10R59 CH2 AMPL BD	0.00 Vdc ±5 mV	Replace channel 1 ampl board and put channel 2 ampl board on extender.
57				Ampl 0.00E2	A10R55		
58				Ampl 0.00E1	A10R69		
59				Ampl 0.00E0	A10R65		
60		Scope (differential input)		Freq 8.00E2 Ampl 9.99E0 Func 5	A10R78	±9.99 Vp square wave	Set A10R78 so that the ± peak amplitudes give a magnitude of ±9.99 Vp.
61	CH 2 output offset	DVM		Ampl 0.00E0 Ofst 9.99 Func 4	A10R81	+9.99 Vdc ±5 mV	
62				Ofst –9.99		–9.99 Vdc ±10 mV	A10R81 may be reset for best results between ±ofst.

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
	Replace channel 2 amplifier board. Put logic interface board on extender. Connect TTL sync signal ±1% of 152 frequency to 152 SYNC IN BNC and to channel 1 of scope. Connect channel 1 BNC of 152 to channel 2 of scope. Display two cycles, observing lock. Using time delay multiplier, expand and display the second SYNC IN signal leading edge at X 100 magnification. Set A11R20 for coincidence of 152 reference sine positive going zero crossing point with the sync in leading edge.						
63	SYNC IN cal	Dual trace scope (alt or chop display, int trig, channel 1 only, pos slope)	CH 1 BNC SYNC IN BNC	CH 1 Freq 8.00E2 Ampl 9.99E0 Ofst 0 Func 3 Angl 000.0	A11R20 LOGIC INT. BD	Coincidence of leading edge of SYNC IN signal on channel 1 of scope with 0° zero crossing of 152 reference carrier sine output on channel 2 of scope.	
64				Freq 9.99E3 4	A11R19		Reset sync [illegible] to ±1% [illegible] and proceed [illegible] manner [illegible] 63. Repeat [illegible] 63 and 64 as necessary for proper calibration.
	Replace all boards and front panel. Allow ½ hour stabilization. Connect 800 Hz sync TTL signal to SYNC IN BNC and a 20 Hz ±5.00V sine from modulation source to AUX 2 BNC. Ensure the modulation sine has no dc offset. Connect channel 2 suppressed carrier output to scope with differential comparator.						
65	SCM	Comparator scope	CH 2 (CH1 AB R14 15 10)	Freq 8.00E2 CH 2 Ampl 9.99E0 Ofst 0 Func 3 Angl 000.0	A9R36 A9R37 A9R32	Even absolute amplitude of alternate SCM cycles at both the positive and negative envelope peaks.	Sync scope [illegible] the 20 Hz [illegible] lation signal modulation [illegible] even, put [illegible] plier board [illegible] extender and [illegible] adjust offset and linear[illegible]
66			(CH1 AB R13 21)		A9R35 A9R43	±9.99V amplitude of SCM, with minimum dc offset. Crossover point of carrier at 0 Vdc.	Check balance of SCM output and return to step 65, if [illegible] even.

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
67	System check	Spectrum analyzer HP3580A or equivalent setup: 800 Hz F_o 1 Hz bw 5 Hz/div Input — +20 dBm		CH 1 Func 0 Execute CH 2 Func 0 Execute		Display center freq in center of analyzer as suppressed carrier at approximately −40 dBm and sidebands at center frequency of ±20 Hz at approx −7 dBm.	Replace multiplier board and allow unit to re-stabilize. Adjust the dc offset of the external AUX 2 input. It need only be adjusted once at this setting.
68				CH 2 Ampl −9.99E0			
69				CH 2 Ampl 9.99E0 Func 1			
70				CH 2 Ampl −9.99E0			
71				CH 2 Ampl 9.99E0 Angle 000.0 Func 3			
72				Angle 090.0			
73				Angle 180.0			
74				Angle 270.0			
75				Angle XXX.X			XXX.X = any desired angle between the 4 quadrants.

Assuming poor carrier suppression in general in steps 65 thru 70, the dc offset of the external 20 Hz modulation source may be adjusted for best suppression. If uneven results are obtained at the four quadrants (steps 71 - 74), one or more may have some offset. The respective control may be adjusted for improved results.

Step	Control
71	A3R110
72	A3R112
73	A3R106
74	A3R108

EFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/P
ONE	CAP,CER,.01MF,50V	CK-103 LONG LEAD	CRL	1500-01-0300	4
ONE	CAP,CER,.1MF,10V	UK10-104	ARCO	1500-01-0412	21
ONE	CAP,CER,33PF,1KV	DD-330	CRL	1500-03-3011	1
ONE	CAP,CER,47PF,1KV	DD-470 LONG LEAD	CRL	1500-04-7001	1
ONE	CAP,ELECT,250MF,16V	500D257G016DF7	SPRAG	1500-32-5101	2
ONE	CAP,TANT,33MF,10V	150D336X9010B2	SPRAG	1500-73-3601	13
ONE	SINE CALCULATOR	152-122	WVTK	1700-00-0672	1
ONE	ADAPTER PLUG 14 PIN	6144-14	SAE	2100-02-0042	1
ONE	SKT,IC,14PIN,WW	CSA2200-14BC	SAE	2100-03-0002	50
ONE	SKT,IC,16PIN,WW	CSA2200-16BC	SAE	2100-03-0003	3
ONE	SKT,IC,12PIN,WW	CSA2300-12BC	SAE	2100-03-0004	4
ONE	CONN PIN,MALE (UOM-EA PIN)	CA-S36SP-100-230-830	CA	2100-05-0034	30
ONE	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	2
ONE	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	4
ONE	RES,MF,1/8W,1%,49.9K	RN55D-4992F	TRW	4701-03-4992	2
ONE	RES,MF,1/4W,1%,619K	RN60D-6193F	TRW	4701-13-6193	1
ONE	RES MODULE	899-5-R220/330	BECK	4770-00-0004	5

WAVETEK
PARTS LIST

TITLE
PCA,LOGIC INTERFACE

ASSEMBLY NO.
1100-00-0152

REV

EFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/P
ONE	DIODE	1N4581	MICRO	4801-01-4581	1
ONE	DIODE	FD-6666	FAIR	4807-02-6666	2
ONE	IC	LM-306	NSC	7000-03-0600	1
ONE	IC	NE555V	SIG	7000-05-5500	1
ONE	IC	4006	MOT	8000-40-0600	2
ONE	IC	7400	TI	8000-74-0000	5
ONE	IC	7402	TI	8000-74-0200	4
ONE	IC	7404	TI	8000-74-0400	3
ONE	IC	7410	TI	8000-74-1000	2
ONE	IC	7438	TI	8000-74-3800	11
ONE	IC	7474	TI	8000-74-7400	7
ONE	IC	8311/9311	FAIR	8000-83-1100	1
ONE	IC	8601/9601	FAIR	8000-86-0100	2
ONE	IC	74132	TI	8007-41-3200	2
ONE	IC	74161	TI	8007-41-6100	1
ONE	IC	74175	TI	8007-41-7500	1

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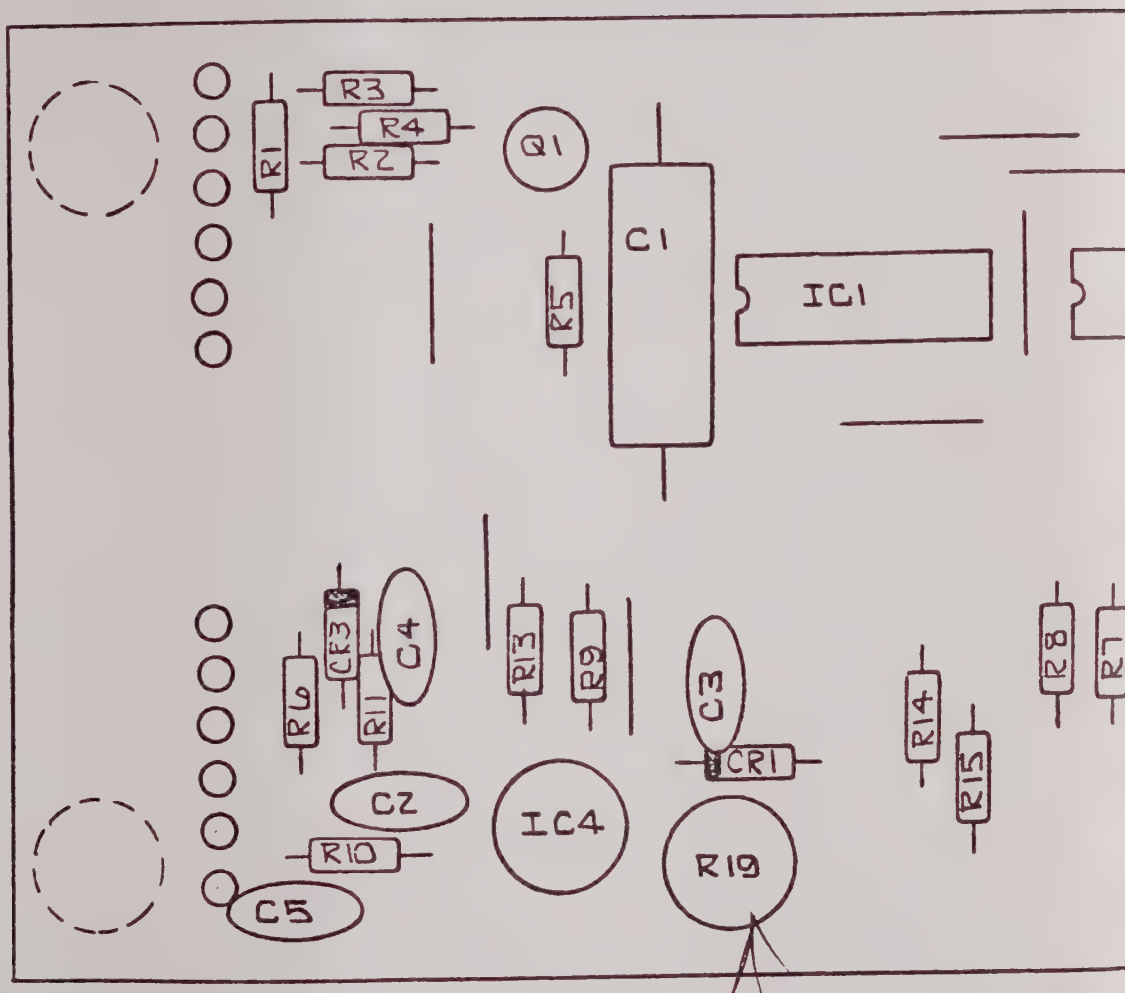
WIRE CONN

+5V
LOG COM
SYNC IN
$\overline{RO}$
$\overline{RI}$
SYNC OUT

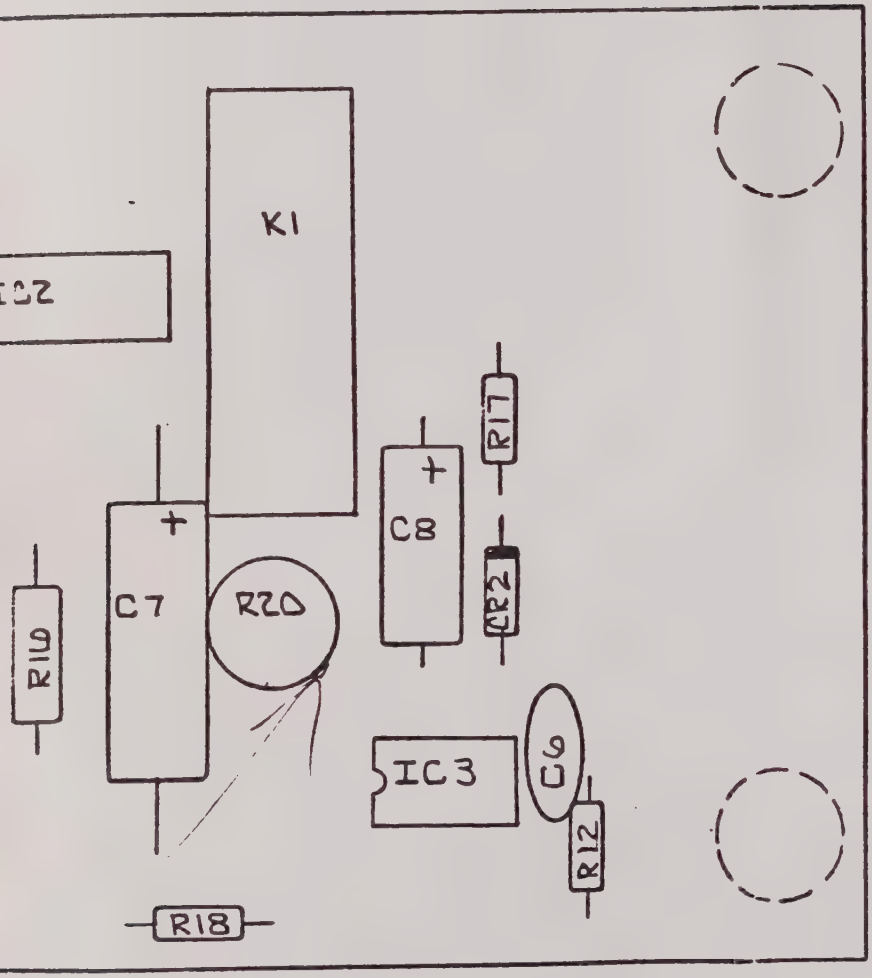
+15V
SIG COM
SYNC SW
VCG TRIM
LP
-15V



SYNC IN

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 10-17-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY PHASE LOCK LOOP A11
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO.	DWG NO. B152-043 REV B
	SCALE	CODE IDENT 23338	SHEET OF

EFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/P1
ONE	CAP,CER,100PF,1KV	DD-101	CRL	1500-01-0111	1
ONE	CAP,CER,.01MF,50V	CK-103	CRL	1500-01-0310	3
ONE	CAP,CER,47PF,1KV	DD-470	CRL	1500-04-7011	1
ONE	CAP,ELECT,100MF,16V	500D107G016DC7	SPRAG	1500-31-0101	1
ONE	CAP,ELECT,50MF,50V	500D506G050DD7	SPRAG	1500-35-0003	1
ONE	CAP,TANT,10MF,20V	150D106X9020B2	SPRAG	1500-71-0601	1
ONE	PLL BOARD	152-143	WVTK	1700-00-0680	1
ONE	RELAY,REED,FORM-A	RA3019-1051	ETROL	4500-00-0007	1
ONE	POT,TRIM,100K	91AR100K	BECK	4600-01-0402	2
ONE	RES,C,1/2W,5%,2.7M	RC20GF-275	STKPL	4700-25-2704	1
ONE	RES,MF,1/8W,1%,100	RN55D-1000F	TRW	4701-03-1000	1
ONE	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	3
ONE	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	2
ONE	RES,MF,1/8W,1%,100K	RN55D-1003F	TRW	4701-03-1003	1
ONE	RES,MF,1/8W,1%,1.21K	RN55D-1211F	TRW	4701-03-1211	1
ONE	RES,MF,1/8W,1%,13K	RN55D-1302F	TRW	4701-03-1302	1
ONE	RES,MF,1/8W,1%,2K	RN55D-2001F	TRW	4701-03-2001	2
ONE	RES,MF,1/8W,1%,221	RN55D-2210F	TRW	4701-03-2210	1

WAVETEK
PARTS LIST

TITLE
PCA,PLL BOARD

ASSEMBLY NO.
1100-00-0680

REV

EFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
ONE	RES,MF,1/8W,1%,2.21K	RN55D-2211F	TRW	4701-03-2211	1
ONE	RES,MF,1/8W,1%,301K	RN55D-3013F	TRW	4701-03-3013	1
ONE	RES,MF,1/8W,1%,332	RN55D-3320F	TRW	4701-03-3320	1
ONE	RES,MF,1/8W,1%,3.32K	RN55D-3321F	TRW	4701-03-3321	1
ONE	RES,MF,1/4W,1%,619K	RN60D-6193F	TRW	4701-13-6193	1
ONE	DIODE	1N4581	MICRO	4801-01-4581	1
NE	DIODE	FD-6666	FAIR	4807-02-6666	2
ONE	TRANS	2N5139	FAIR	4901-05-1390	1
ONE	IC	LM-306	NSC	7000-03-0600	1
ONE	IC	MA-741	FAIR	7000-07-4100	1
ONE	IC	74132	TI	8007-41-3200	1
ONE	IC	MC4044P	MOT	8100-40-4400	1

SECTION 6
PARTS AND SCHEMATICS

6.1 DRAWINGS

The following assembly drawings (with parts list) and schematics are in the arrangement shown below.

6.2 ORDERING PARTS

When ordering spare parts, please specify part number, circuit reference, board, serial number of unit and the function performed.

6.3 ADDENDA

Under Wavetek's product improvement program, the latest electronic designs and circuits are incorporated into each Wavetek instrument as quickly as development and testing permit. Because of the time needed to compose and print instruction manuals, it is not always possible to include the most recent changes in the initial printing. Whenever this occurs, addendum pages are prepared to summarize the changes made and are inserted immediately inside the cover.

Drawing	Drawing No.
Chassis Assembly	152-010
Chassis Parts List	1101-00-0664
Power Supply Assembly	152-046
Power Supply Parts List	1101-00-0669
Power Supply Board Schematic	152-236
Power Supply Board Assembly	152-036
Power Supply Board Parts List	1100-00-0153
Display Board Schematic	152-254
Display Board Assembly	152-054
Display Board Parts List	1100-00-0149
Keyboard Schematic	152-256
Keyboard Assembly	152-056
Keyboard Parts List	1100-00-0154
Mother Board Assembly	152-034
Mother Board Parts List	1100-00-0670
Logic Interface Board Schematic	152-245
Logic Interface Board Assembly	152-045
Logic Interface Board Parts List	1100-00-0152

Drawing	Drawing No.
Sine Calculator Board Schematic	152-255
Sine Calculator Board Assembly	152-055
Sine Calculator Board Parts List	1100-00-0672
VCG Board Schematic	152-230
VCG Board Assembly	152-030
VCG Board Parts List	1100-00-0145
Filter Board Schematic	152-232
Filter Board Assembly	152-032
Filter Board Parts List	1100-00-0146
Phase Board Schematic	152-226
Phase Board Assembly	152-026
Phase Board Parts List	1100-00-0150
Offset, Function Board Schematic	152-227
Offset, Function Board Assembly	152-027
Offset, Function Board Parts List	1100-00-0148
Amplitude/Logic Board Schematic	152-228
Amplitude/Logic Board Assembly	152-028
Amplitude/Logic Board Parts List	1100-00-0147

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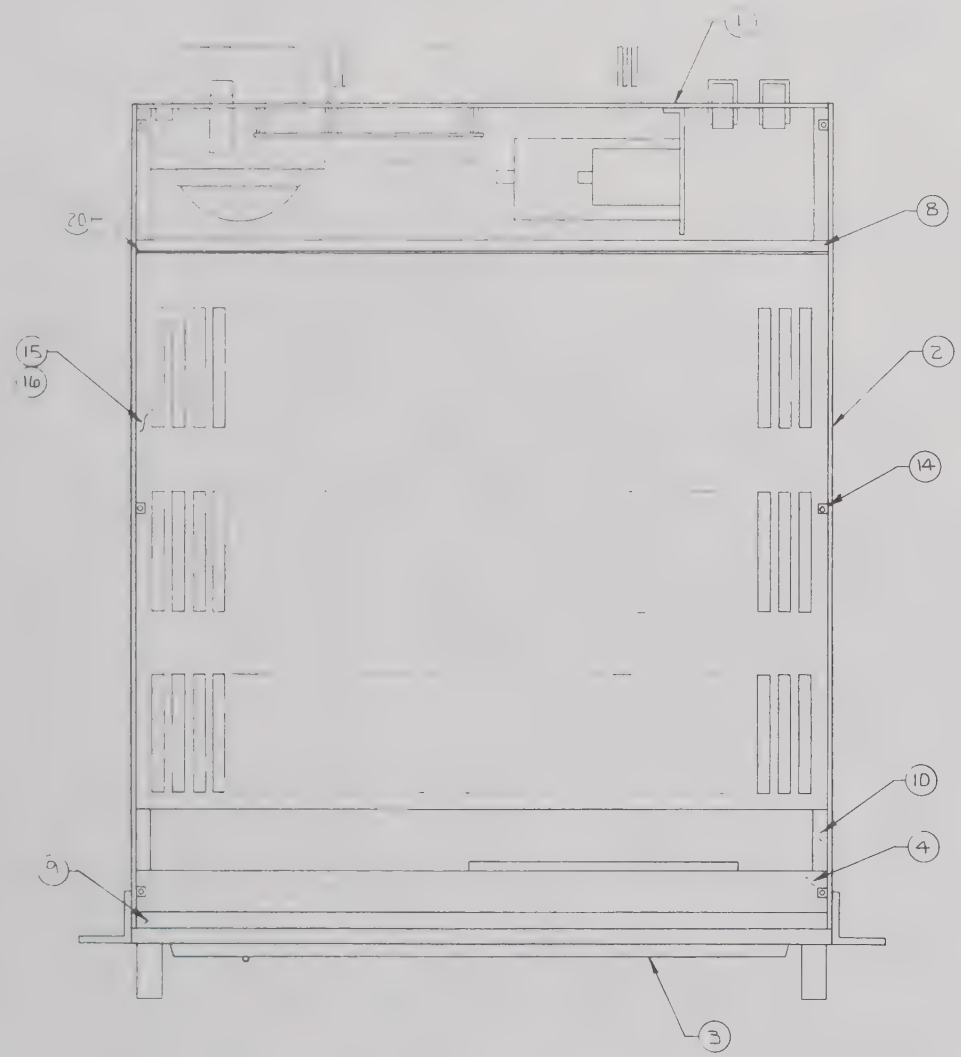

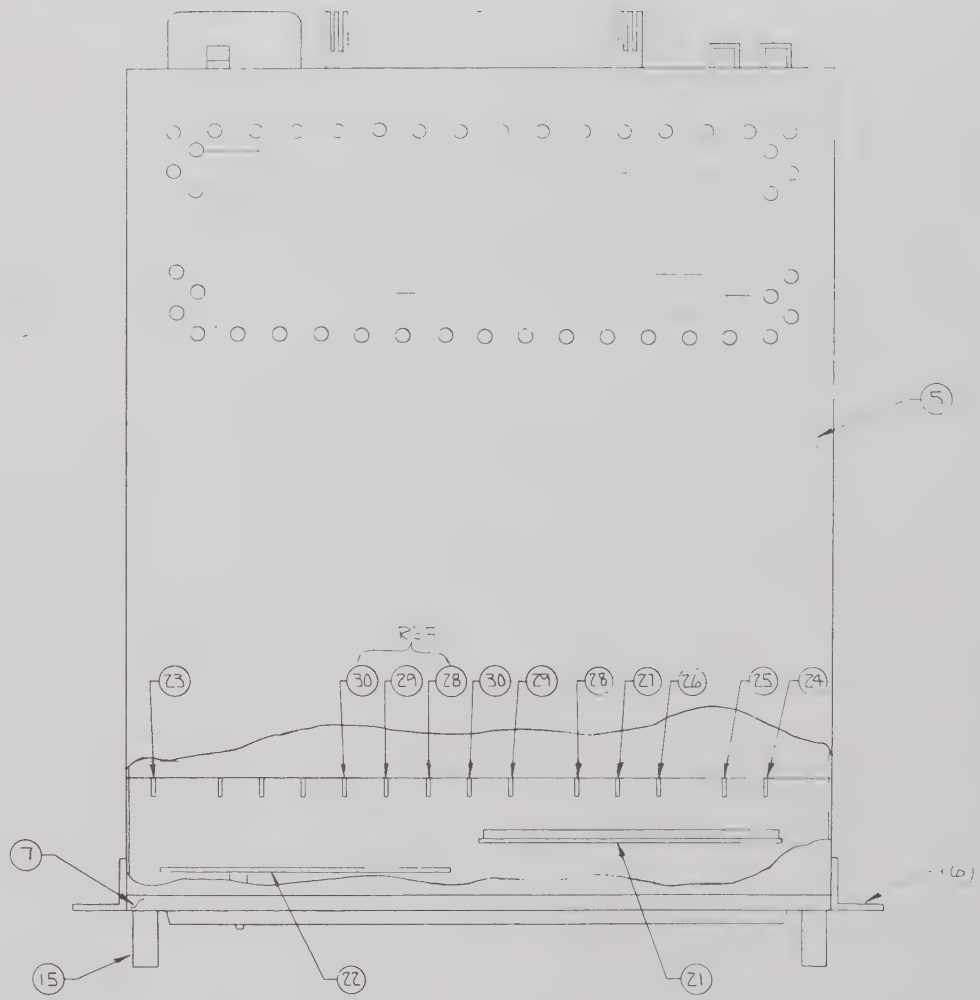

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-28-95	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY CHASSIS
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO 0152-010 REV C
	SCALE 1/2	CODE IDENT NO 23338	SHEET 1 OF 2

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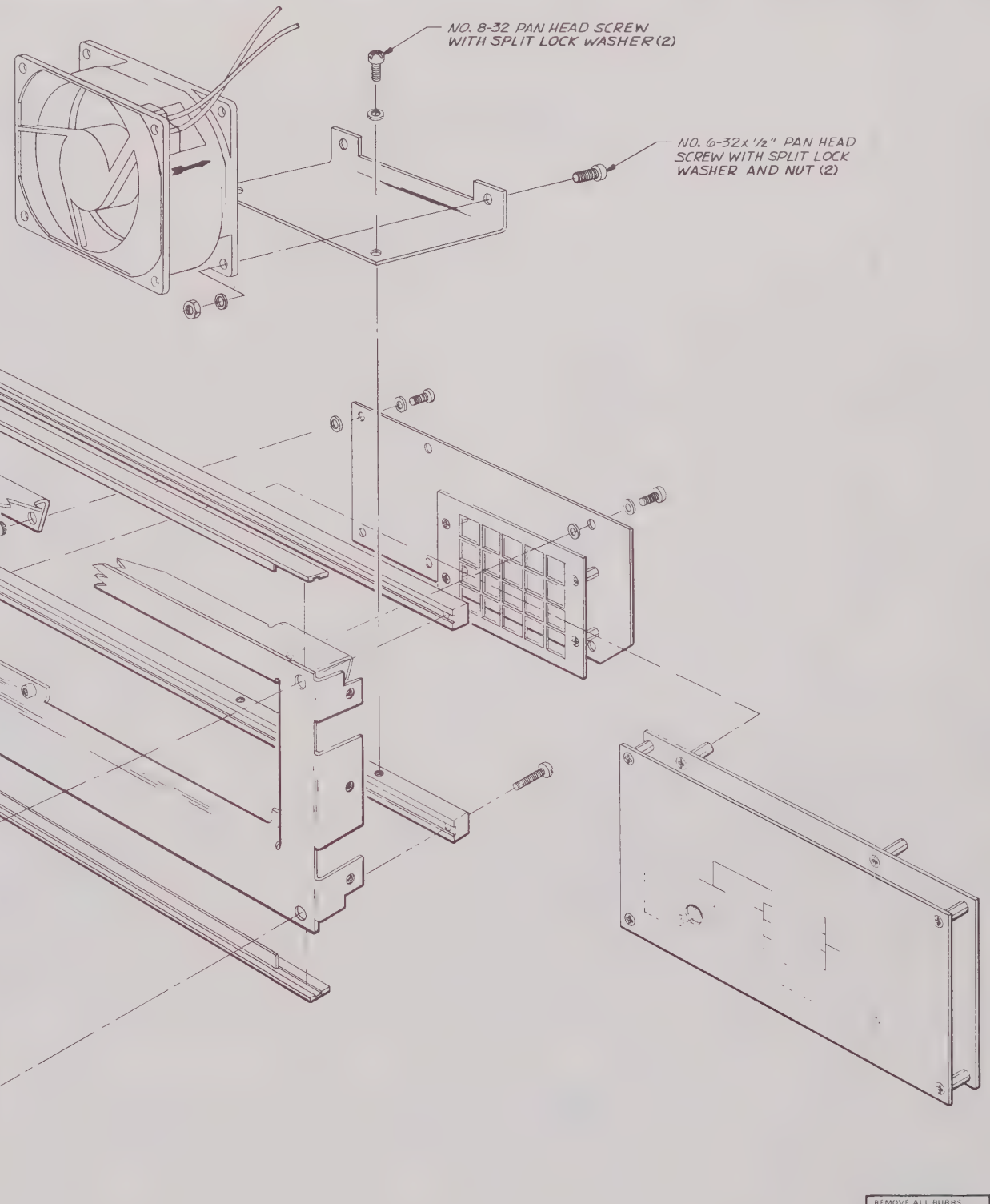
REV	ECN	BY	DATE	APP



NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN D. COOPER	DATE 9-27-78	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY CHASSIS
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES ± XX .030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO D152-010 / REV C
	SCALE		DWG NO 23338 / SHEET 2 OF 2

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RETAINER, PC	152-0851	WVTK	1201-00-0851	1
2	SIDE PLATE	152-316	WVTK	1400-00-8492	2
3	FRONT PANEL	152-324	WVTK	1400-00-8500	1
4	SUB PANEL	152-321	WVTK	1400-00-8513	1
5	COVER, TOP	152-319	WVTK	1400-00-8522	1
6	EARS, RACKMOUNT	152-318	WVTK	1400-00-8532	2
7	TRIM	152-314	WVTK	1400-00-8541	2
8	BAR, SUPPORT, MOTHER	152-308	WVTK	1400-00-8553	2
9	BAR, SUPPORT, PANEL	152-322	WVTK	1400-00-8563	2
10	BAR, SUPPORT, SIDE	152-315	WVTK	1400-00-8573	4
NONE	PANEL, DISPLAY	1400-00-8580	WVTK	1400-00-8580	1
NONE	COVER, BOTTOM	1400-00-8932	WVTK	1400-00-8932	1
NONE	BRACKET, FAN SUPPORT	1400-00-9213	WVTK	1400-00-9213	1
NONE	BRACKET, PWR. SWITCH	1400-00-9233	WVTK	1400-00-9233	1
NONE	SUPPORT BAR	1400-01-4733	WVTK	1400-01-4733	1
NONE	SUPPORT BAR	1400-01-4743	WVTK	1400-01-4743	1
16	GUIDE, BOARD	115-287	CALMK	2100-06-0004	90
17	GUIDE PLATE	115-1123A	CLMRK	2100-06-0005	2

WAVETEK PARTS LIST	TITLE CHASSIS	ASSEMBLY NO. 1101-00-0664 PAGE 1	REV E

DECU-BUSINESS FORMS PRINTING, INC 2/81

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	FAN	760-126LF-2182-11115	EIRI	2600-00-0006	1
20	TY-WRAP	TY-523M	TB	2300-00-0006	10
NONE	CABLE CLAMP	832	SMITH	2800-00-0009	2
15	HANDLE	1052	USECO	2800-07-0019	2
NONE	BAIL W/FEET, 15 1/2	BAIL 15 1/2	BUKEY	2300-08-0001	1
NONE	SPEEDNUT, SELF RETAIN	C7494-632-4	TINN	2800-09-0003	6
NONE	INSERT #8	74-11-108-13	SOTCO	2800-09-0018	6
14	FAST, CHASSIS	1591-C11	USECO	2800-09-0022	12
NONE	INSERT #10	74-11-210-13	SOTCO	2800-09-0026	8
NONE	PLUG BUTTON	48152	UNCAR	2800-35-0001	3

WAVETEK PARTS LIST	TITLE CHASSIS	ASSEMBLY NO. 1101-00-0664 PAGE 2	REV E

DECU-BUSINESS FORMS PRINTING, INC 2/81

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST CHASSIS
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO 1101-00-0664 / REV E
	SCALE		CODE IDENT 23338 / SHEET OF

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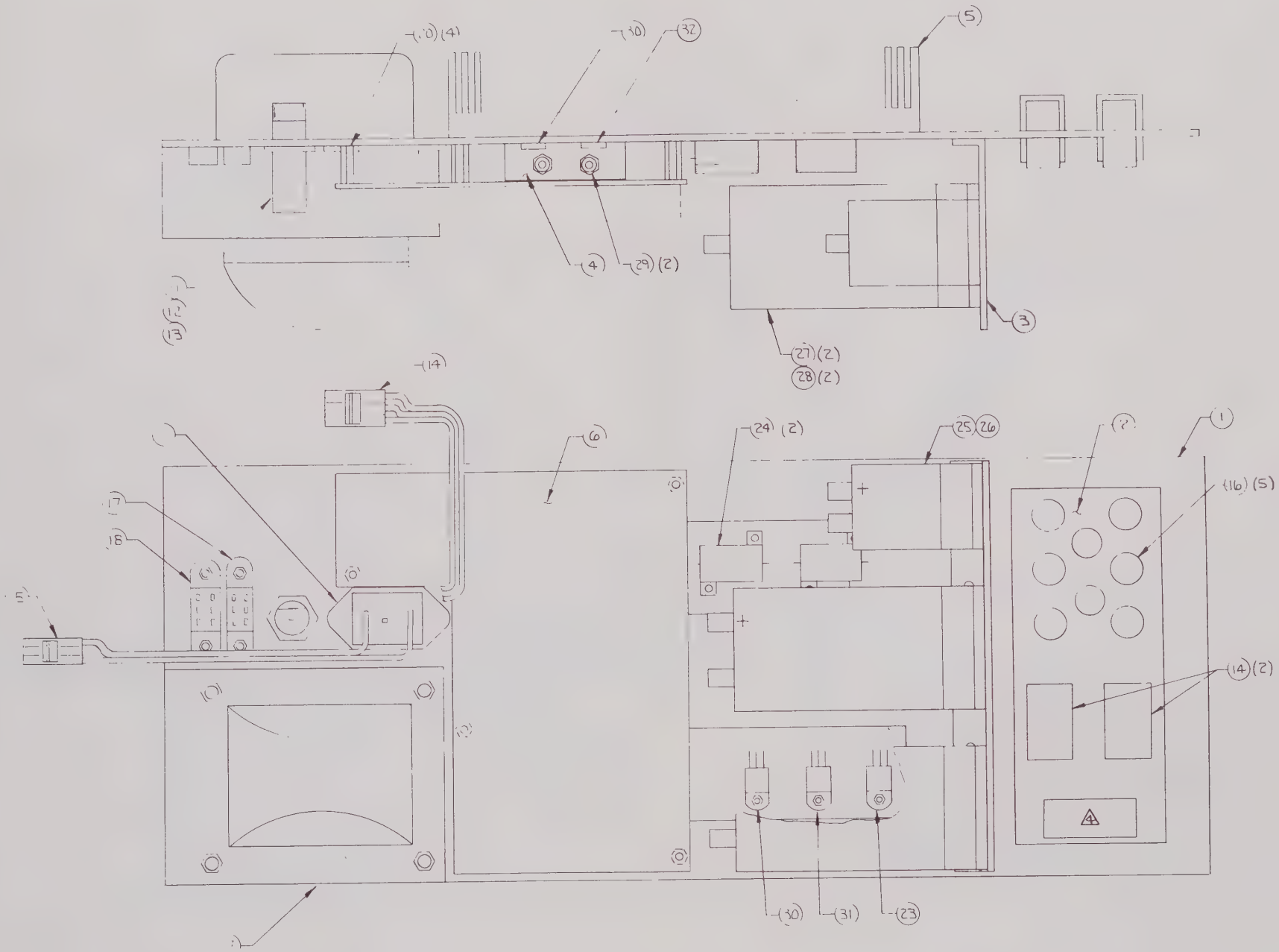
REV	DESCRIPTION	BY	DATE	APP
A	INITIAL RELEASE	[illegible]	[illegible]	
B	ECN 2334	LJTE	7-1-82	



⚠ USED WHEN IEC INTERFACE IS INSTALLED ONLY.

3. FOR TRUE WIRING SEE SHT 2 & 3

2. REAR CONN MTG PLATE (ITEM 2) IS LAST ASSY TO BE MOUNTED ON REAR PANEL.

1. WIRES FROM 4 & 15 PIN MOLEX SHOWN FOR REF ONLY. APPROX. WIRE CORSE.

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 4/20/82	WAVETEK SAN DIEGO CALIFORNIA
MATERIAL	PROTNGR		TITLE ASSEMBLY POWER SUPPLY
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ± .XX ±.03		
	DO NOT SCALE DWG		
	SCALE	MODEL 52	DWG NO 1521 [illegible] REV B
		CODE IDENT 23338	SHEET 1 OF 1

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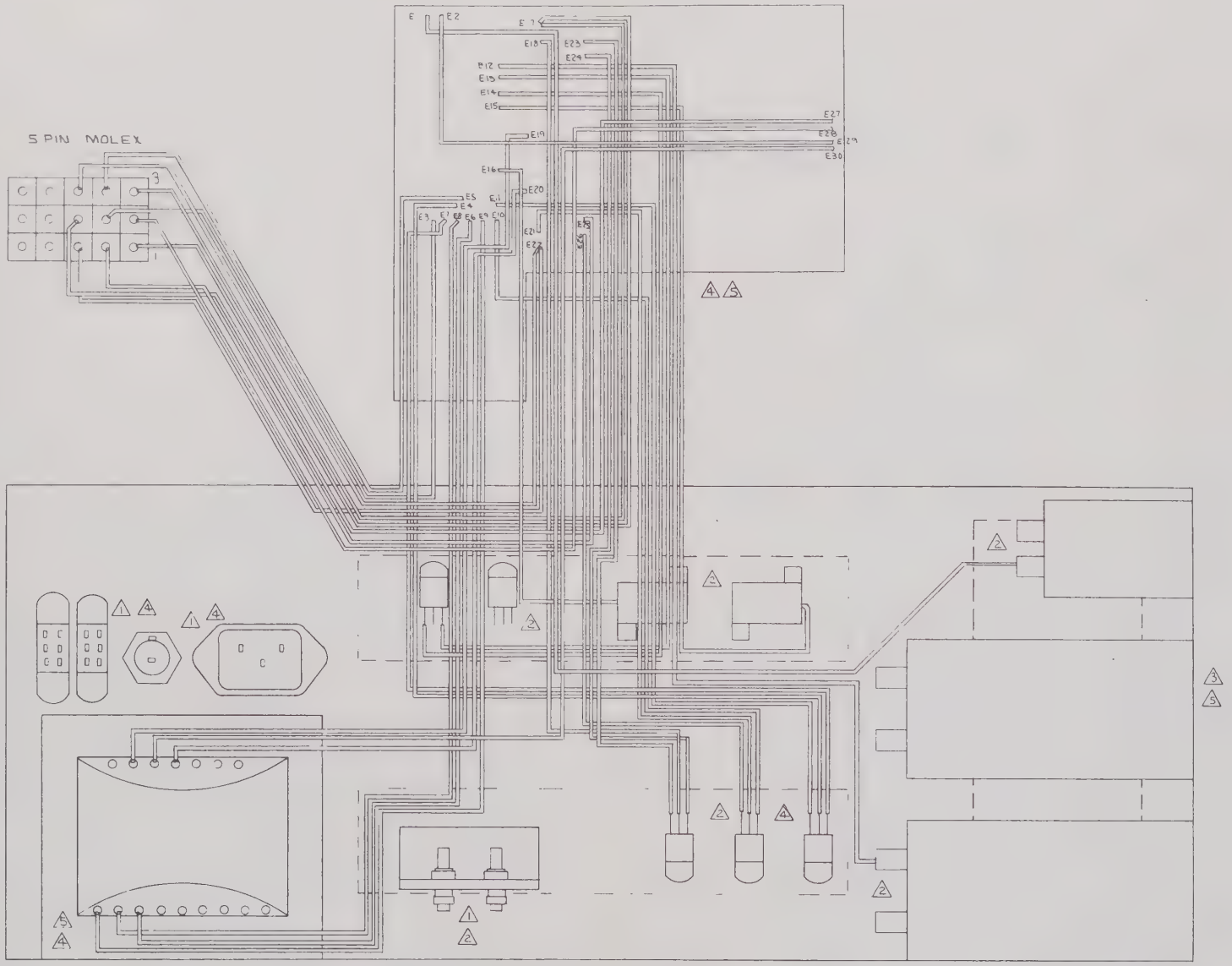
REV	ECN	BY	DATE	APP

POWER SUPPLY BD 152-1360



7. POWER SUPPLY BD AND CAPACITORS SHOWN REMOVED FROM REAR PANEL.
6. ADD WIRE TIES AS REQUIRED
5. ASSEMBLE LARGE CAPACITORS (ON BRACKET), TRANSFORMER, AND POWER SUPPLY BD, (ASSEMBLED), TO REAR PANEL.
4. INSTALL AND SOLDER ALL HARNESSES.
3. MOUNT LARGE CAPACITORS TO MOUNTING BRACKET.
2. SOLDER TIPS 20W RESISTORS SOLDER LUGS FOR LARGE CAPACITORS AND TRANSISTORS TO WIRE HARNESS
1. INSTALL TRANSISTORS SWITCHES FUSE HOLDER AND AC RECEPTICAL TO REAR PANEL

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3/18/85	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO 2152-046 REV 3
	SCALE	CODE IDENT 23338	SHEET 2 OF 4

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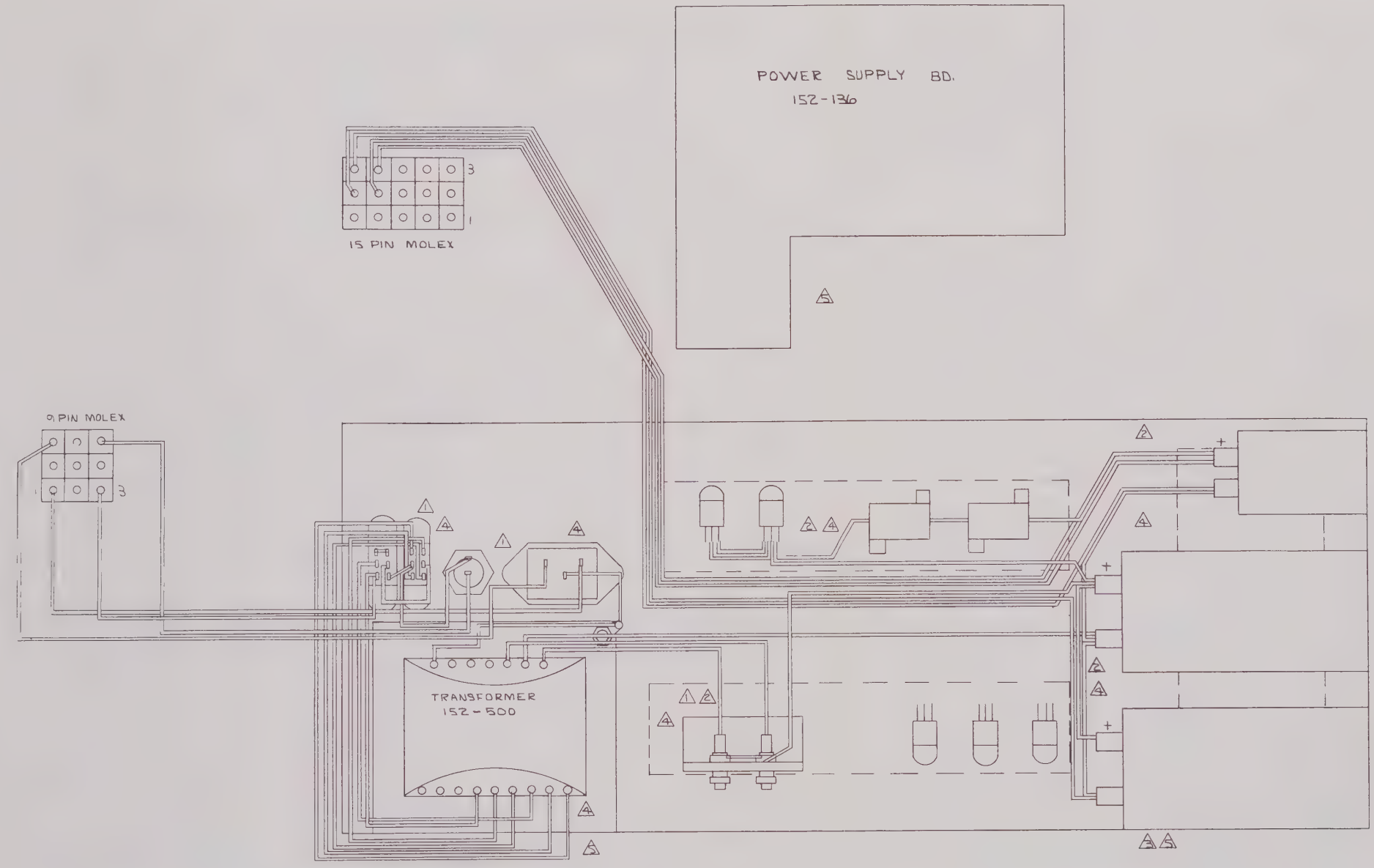
REV	ECN	BY	DATE	APP



7 POWER SUPPLY BD. AND CAPACITORS SHOWN REMOVED FROM REAR PANEL.

6 ADD WIRE TIES AS REQUIRED.

△5 ASSEMBLE LARGE CAPACITORS, (ON BRACKET) TRANSFORMER, AND POWER SUPPLY BD. (ASSEMBLED) TO REAR PANEL.

△4 INSTALL AND SOLDER ALL HARNESSES.

△3 MOUNT LARGE CAPACITORS TO MOUNTING BRACKET.

△2 SOLDER TIP'S, 20W RESISTORS, SOLDER LUGS FOR LARGE CAPACITORS AND TRANSISTORS TO WIRE HARNESS.

△1 INSTALL TRANSISTORS, SWITCHES, FUSE AND A.C RECEPTICAL TO REAR PANEL.

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-18-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO D152-046 / REV A
	SCALE		CODE IDENT 23338 / SHEET 3 OF 4

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION

REV	LTR	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	TRANSFORMER	152-500	WVTK	1204-00-0025	1
NONE	STANDOFF	201-333	WVTK	1400-00-4173	4
NONE	REAR PANEL	152-310	WVTK	1400-00-8590	1
NONE	PLATE, CONN MTG	152-331	WVTK	1400-00-8603	1
NONE	BRACKET, CAPACITOR	152-312	WVTK	1400-00-8613	1
NONE	HEATSINK, TRANSISTOR	152-307	WVTK	1400-00-8623	1
NONE	HEATSINK RFF 3200-06-0002	152-311	WVTK	1400-00-8633	1
NONE	I.D. LABEL	1400-00-9090	WVTK	1400-00-9090	1
NONE	COVER, CONN. PLATE	1400-00-9192	WVTK	1400-00-9192	1
NONE	CAP. ELEC. 18000MF, 25V	91C25JC183	STM	1500-31-8302	2
NONE	CAP. ELECT. 6000MF. 10V	91C10HA63	STM	1500-36-0201	1
NONE	BNC CONN	KC-7946	KING	2100-01-0002	5
NONE	CONN. 9PIN	03-06-1091	MOLEX	2100-02-0010	1
NONE	CONN. 15PIN	03-09-1151	MOLEX	2100-02-0012	1
NONE	RECEPT. POWER	EAC-301	SWCFT	2100-03-0005	1
NONE	TERM, LOCK LUG	1414-4	SMITH	2100-04-0008	1
NONE	TERM, LOCK LUG	1414-8	SMITH	2100-04-0010	1

WAVETEK PARTS LIST	TITLE REAR PANEL	ASSEMBLY NO. 1101-00-0669 PAGE 1	REV C

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	TRANS	TIP-34	TI	4902-00-0340	1
NONE	TRANS	TIP-35	TI	4902-00-0350	1
NONE	SW ASSY SLIDE HI-LO	SW422-FT-HK	UID	5105-00-0001	1
NONE	SWITCH ASSY SLIDE	46256-LF	SWCFT	5105-00-0002	1
NONE	SOLDER GUARD	46256-LF-SG	SWCFT	5105-09-0001	2
NONE	VOLTAGE REGULATOR	MA7805UC	FAIR	8000-78-0500	1

WAVETEK PARTS LIST	TITLE REAR PANEL	ASSEMBLY NO. 1101-00-0669 PAGE 3	REV C

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SOLDER LUG	1497	SMITH	2100-04-0012	5
NONE	LUG	35	ILSCO	2100-04-0018	6
NONE	PIN FEMALE	02-06-1103	MOLEX	2100-05-0002	4
NONE	PIN, FEMALE	02-09-1118	MOLEX	2100-05-0026	13
NONE	FUSE HOLD	031.1653/031.1665	SCHUR	2400-05-0012	1
NONE	FUSE, 2A, 250V, S-B	MDX 2	BUSS	2400-05-0030	1
NONE	TY-WRAP	TY-523M	TB	2800-00-0006	20
NONE	CABLE CLAMP	B35	SMITH	2800-00-0010	1
NONE	RETAINER, SPRING	D-191	WEKSR	2800-09-0007	1
NONE	INSERT # 6	74-11-106-13	SOTCO	2800-09-0017	14
NONE	CAP. MTG. BKT	FJMR	STM	2800-12-0006	2
NONE	CAP. MTG. BKT	FHMR-2	STM	2800-12-0007	1
NONE	WASHER, SHOULDER	2668	SMITH	2800-27-0004	10
NONE	RES. MF 1/4W, 1%, 10	RN60D-10ROF	TRW	4701-13-1009	1
NONE	RES. WW, 25W 1%, .1 OHM	RE70GR100-, 1 OHM, 1%	DALE	4702-93-0019	2
NONE	DIODE	1N1199A	MOT	4806-01-1199	2
NONE	TRANS	TIP-33	TI	4902-00-0330	2

WAVETEK PARTS LIST	TITLE REAR PANEL	ASSEMBLY NO. 1101-00-0669 PAGE 2	REV C

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST REAR PANEL
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO 1101-00-0669 REV C
	SCALE	CODE IDENT 23338	SHEET OF

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REV	ECN	BY	DATE	APP
A	3389			

T1
XMFR
P/N 152-500
MAG. DEV.
614D2A

DIODE HEAT SINK

BRACKET

OPTIONAL

DISPLAY 152-054

LOGIC COMMON

SIGNAL COMMON

AUX COM

LAST REF DESIG USED

CAP	C30
DIODES	CR9
RES	R29
TRAN	Q10
INT CKT	IC4

4 1.62 KΩ ON 2 CHANNEL
1.21 KΩ ON 3 CHANNEL OR SPECIAL OPTION INSTRUMENTS.

3 ALL CAP VALUES ARE IN MICROFARADS(μfd) & ARE .01 50V EXCEPT AS SHOWN

2 ALL RESISTOR VALUES ARE IN OHMS Ω

1 ALL DIODE VALUES ARE IN4002

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: SCHEMATIC DIAGRAM POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 152 · DWG NO D152-236 · REV A
	SCALE		CODE IDENT 23338 · SHEET 1 OF 1

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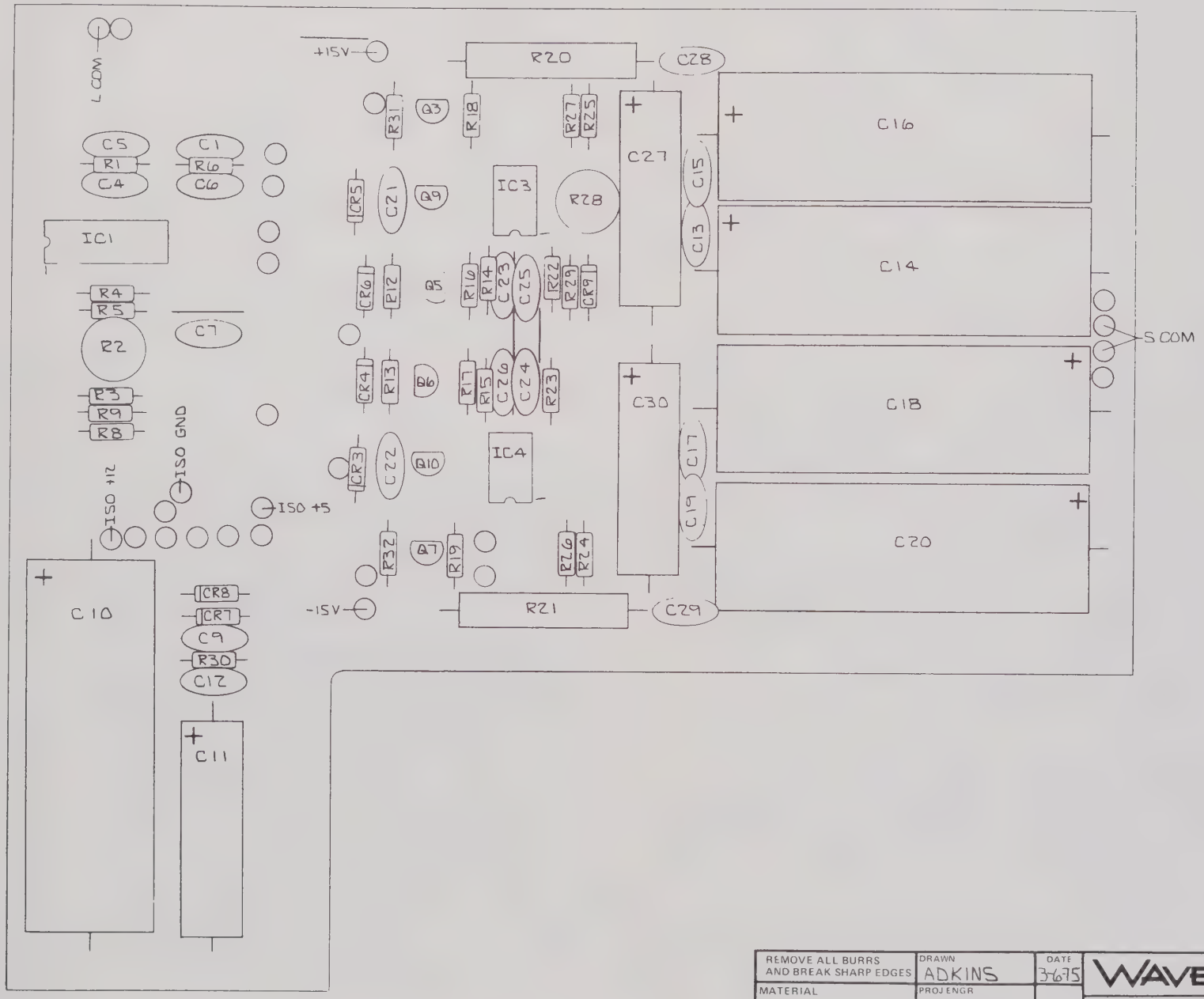
A	ADDED +VE V SIGNS NOTE #1	RA	9-16-75



1. TERMINALS SHOULD BE USED FOR +15V & -15V CONNECTIONS

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-6-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY BD.
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO C152-036 REV A
	SCALE	CODE IDENT 23338	SHEET 1 OF

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP, CER, MN, .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	6
NONE	CAP, CER, MON, .1MF, 50V	CAC03Z5U104Z050A	CORNG	1500-01-0405	11
NONE	CAP, CER, 33PF, 1KV	DD-330	CRL	1500-03-3011	2
NONE	CAP, ELECT, 1000MF, 35V	39D108G035GL6	SPRAG	1500-31-0212	5
NONE	CAP, ELECT, 250MF, 16V	500D257G016DF7	SPRAG	1500-32-5101	3
NONE	POWER SUPPLY	152-136	WVTK	1700-00-0153	1
NONE	TERM	1309D1	USECO	2100-05-0027	2
NONE	POT, TRIM, 1K	91AR1K	BECK	4600-01-0209	2
NONE	RES, MF, 1/8W, 1%, 100	RN55D-1000F	TRW	4701-03-1000	1
NONE	RES, MF, 1/8W, 1%, 1K	RN55D-1001F	TRW	4701-03-1001	1
NONE	RES, MF, 1/8W, 1%, 10K	RN55D-1002F	TRW	4701-03-1002	2
NONE	RES, MF, 1/8W, 1%, 1.5K	RN55D-1501F	TRW	4701-03-1501	1
NONE	RES, MF, 1/8W, 1%, 1.62K	RN55D-1621F	TRW	4701-03-1621	1
NONE	RES, MF, 1/8W, 1%, 2.21K	RN55D-2211F	TRW	4701-03-2211	2
NONE	RES, MF, 1/8W, 1%, 2.87K	RN55D-2871F	TRW	4701-03-2871	1
NONE	RES, MF, 1/8W, 1%, 332	RN55D-3320F	TRW	4701-03-3320	1
NONE	RES, MF, 1/8W, 1%, 3.83K	RN55D-3831F	TRW	4701-03-3831	1
NONE	RES, MF, 1/8W, 1%, 3.92K	RN55D-3921F	TRW	4701-03-3921	1

WAVETEK PARTS LIST	TITLE PC- POWER SUPPLY	ASSEMBLY NO. 1100-00-0153	REV
		PAGE 1	

REFERENCE DESIGNATURS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES, MF, 1/8W, 1%, 464	RN55D-4640F	TRW	4701-03-4640	2
NONE	RES, MF, 1/8W 1% 4.75K	RN55D-4751F	TRW	4701-03-4751	3
NONE	RES, MF, 1/8 1%, 499	RN55D-4990F	TRW	4701-03-4990	1
NONE	RES, MF, 1/8W 1%, 6.19K	RN55D-6191F	TRW	4701-03-6191	1
NONE	RES, MF 1/8W, 1%, 825	RN55D-8250F	TRW	4701-03-8250	2
NONE	RES, MF, 1/8W, 1%, 8.25K	RN55D-8251F	TRW	4701-03-8251	1
NONE	RES, MF, 1/8W, 1% 9.09K	RN55D-9091F	TRW	4701-03-9091	2
NONE	RES, MF, 1/8W, 1%, 90.9	RN55D-90R9F	TRW	4701-03-9099	1
NONE	RES, WW, 5W, 5%, .2	243E2R05	SPRAG	4702-65-2009	2
NONE	DIODE	1N4581	MICRO	4801-01-4581	1
NONE	DIODE	1N4002	FAIR	4801-02-0001	6
NONE	TRANS	2N3642	FAIR	4901-03-6420	3
NONE	IC	723PC	FAIR	7000-07-2300	1
NONE	IC	LM741CN	NSC	7000-07-4100	2

WAVETEK PARTS LIST	TITLE PC- POWER SUPPLY	ASSEMBLY NO. 1100-00-0153	REV
		PAGE 2	

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO 1100-00-0153 / REV
	SCALE		CODE IDENT 23338 / SHEET OF

NOTE UNLESS OTHERWISE SPECIFIED

BISHOP GRAPHICS/ACCUPRESS REORDER NO A-2884

FROM LOGIC INTERFACE BD

P1

+5V
DIG COM
D SYNC
D CLK
DD3
DD2
DD1
DD0

NO CONNECTION

SHIFT REGISTER

74164

A3 7400

A4

A5 8863

A2

7474

B1 9370

C1 74175

D3 74175

D4 74175

D5 4006

FND357/TIL313 DS1 DS2 DS3 DS4 DS5 DS6 DS7 DS8

(MINUS)

MULTIPLEX

CHANNEL

ANGL/ (D5)

DIG 1 (D5)
DIG 2 (D5)
DIG 3 (D5)
DIG 4 (D5)
DIG 5 (D5)
DIG 6 (D5)
DIG 7 (D5)
DIG 8 (D5)
DIG 9

NOT USED ON 159

NOT USED ON 152

7438

SIN
COS
TRK
SQR
CONT
TRG
GATED
SELECTED
ANGLE
FREQ
OFFSET
AMPL

TYP FND357 PIN NUMBERS

TYP TIL313 PIN NUMBERS

1. ○ DENOTES WIRE COLOR PER COLOR CODE.
3. ▭ DENOTES LABELING ON BOARD OR DISPLAY PANEL.
2. ALL RESISTORS ARE ±1% · 1/8W
⚠ ADD JUMPER WHEN LOADING FOR MODEL 159.

WIRE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN MAE
DATE 4 3 9[illegible]
TOLERANCE UNLESS OTHERWISE SPECIFIED
XXX ± .010 ANGLES ± 1
DO NOT SCALE PRINT
SCALE —

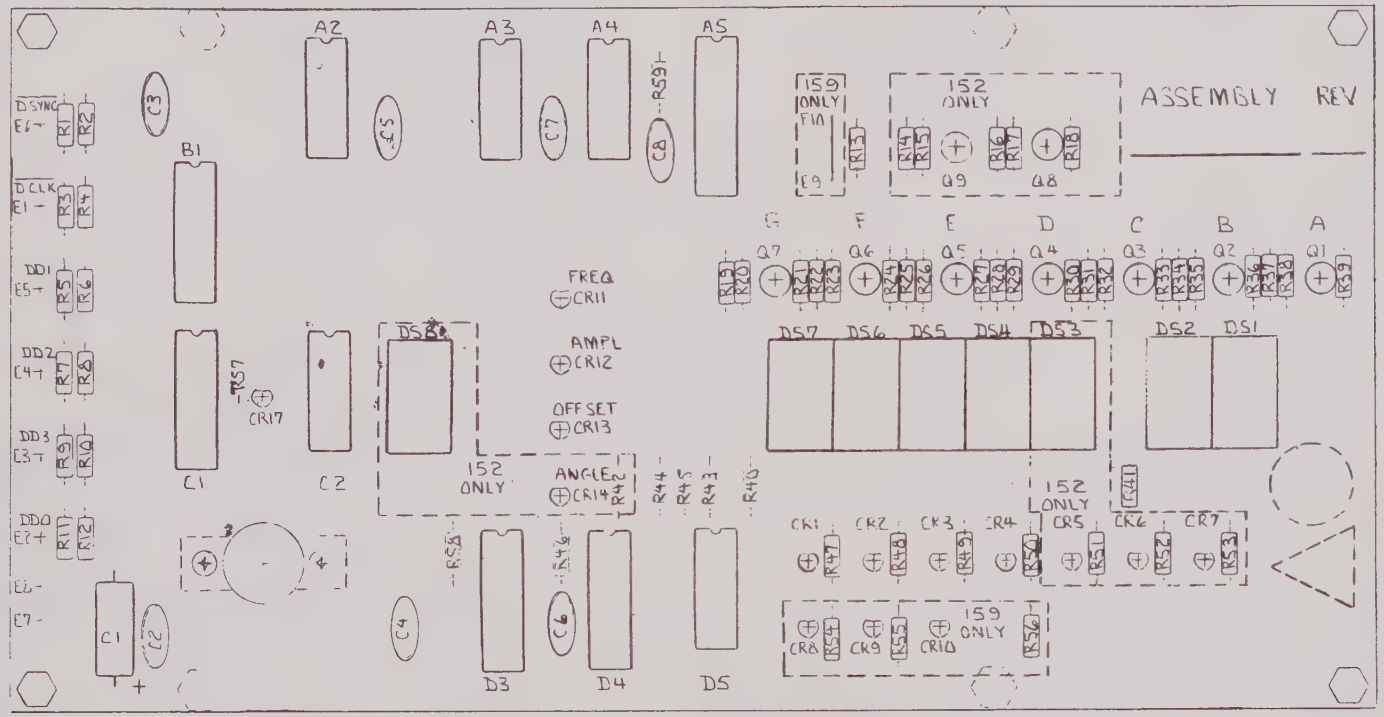
WAVETEK SAN DIEGO, CALIFORNIA

TITLE
SCHEMATIC – [illegible] BOARD

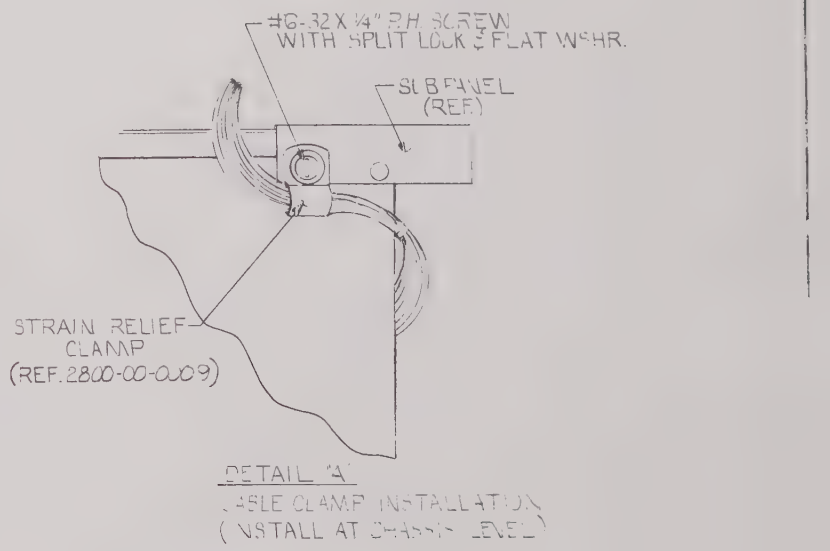
REV	ECN	BY	DATE	APP
A	1815	CC	9-28-73	
B	2531	LCC	1-14-74	

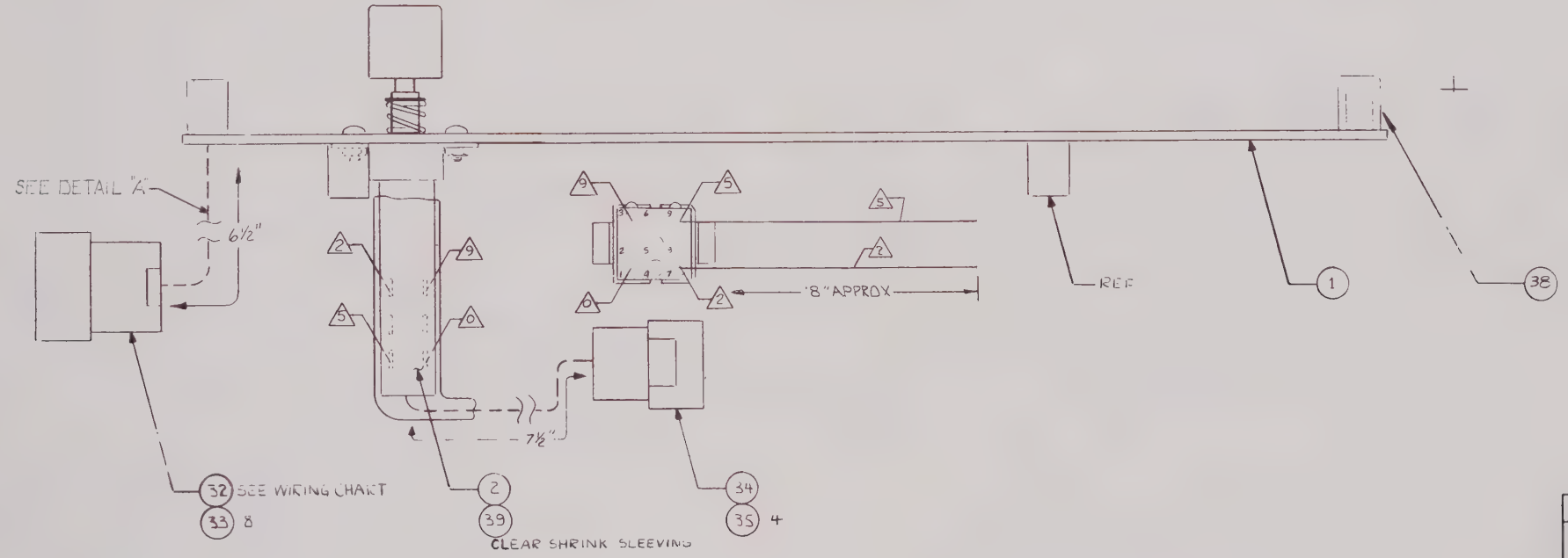
WIRING CHART

BOARD LOCATION	COLOR WIRE COLOR	CONNECTOR PIN NUMBER
E1	1	8
E2	2	10
E3	3	14
E4	4	11
E5	5	15
E6	6	13
E7	0	7
E8	7	4



158-152 DISPLAY BOARD SILKSCREEN MASTER


#6-32 X 1/4" P.H. SCREW WITH SPLIT LOCK & FLAT WSHR.
SUB PANEL (REF.)
STRAIN RELIEF CLAMP (REF. 2800-00-009)
DETAIL "A"
CABLE CLAMP INSTALLATION
(INSTALL AT CHASSIS LEVEL)



NOTES: 1. △ DENOTES WIRE COLOR PER COLOR CODE.

MATERIAL: SEE PARTS LIST	DRAWN: HAC	DATE: 7-7-73	WAVETEK
	RELEASE NO.		TITLE: SILKSCREEN ASSEMBLY DWG - DISPLAY BOARD
	SCALE: 2/1	MODEL NO: 152	DWG NO: D152-054 REV: B
		ECN OR ECR: 2333A	SHEET 1 OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP, CER, MN, .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	7
NONE	CAP, TANT, 33MF, 10V	150D336X9010B2	SPRAG	1500-73-3601	1
NONE	DISPLAY	158-151	WVTK	1700-00-0105	1
NONE	PLUG, 9PIN	03-06-2091	MOLEX	2100-02-0011	1
NONE	PLUG, 15PIN	03-09-2151	MOLEX	2100-02-0013	1
NONE	PIN, MALE	02-06-2103	MOLEX	2100-05-0003	4
NONE	PIN, MALE	02-09-2118	MOLEX	2100-05-0005	8
NONE	CABLE CLAMP	832	SMITH	2800-00-0009	2
NONE	STANDOFF, SWAGE .375 H, .250 DIA 6-32, .062 MAT'L	6910-6-2C	LYNTR	2800-03-0002	8
NONE	RES, MF, 1/8W, 1%, 15	RN55D-15R0F	TRW	4701-03-1509	9
NONE	RES, MF, 1/8W, 1%, 221	RN55D-2210F	TRW	4701-03-2210	6
NONE	RES, MF, 1/8W, 1%, 2.21K	RN55D-2211F	TRW	4701-03-2211	3
NONE	RES, MF, 1/8W, 1%, 274	RN55D-2740F	TRW	4701-03-2740	14
NONE	RES, MF, 1/8W, 1%, 332	RN55D-3320F	TRW	4701-03-3320	15
NONE	RES, MF, 1/8W, 1%, 6.81K	RN55D-6811F	TRW	4701-03-6811	9
NONE	LED	TIL209A	TI	4899-00-0005	12
NONE	LED	HDSP-3106	HP	4899-00-0009	8

WAVETEK PARTS LIST	TITLE DISPLAY	ASSEMBLY NO. 1100-00-0149	REV B
		PAGE 1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	TRANS	2N3640	FAIR	4901-03-6400	9
NONE	SWITCH ASSY PB	157-422	WVTK	5103-00-0011	1
NONE	PUSH BUTTON, BLACK	B315 BLACK	CRL	5103-04-0001	1
NONE	IC	4006	MOT	8000-40-0600	1
NONE	IC	7400	TI	8000-74-0000	1
NONE	IC	7438	TI	8000-74-3800	1
NONE	IC	7474	TI	8000-74-7400	1
NONE	IC	DS8863	NSC	8000-88-6300	1
NONE	IC	9370DC	FAIR	8000-93-7000	1
NONE	IC	74164	TI	8007-41-6400	1
NONE	IC	74175	TI	8007-41-7500	3

WAVETEK PARTS LIST	TITLE DISPLAY	ASSEMBLY NO. 1100-00-0149	REV B
		PAGE 2	

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST DISPLAY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO 1100-00-0149 / REV B
	SCALE		FSCM IDENT 23338 / SHEET OF

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REV	ECN	BY	DATE	APP'D
A	2658	fm	10/82	

KEYBOARD ARRANGEMENT

7	8	9	A	G
4	5	6	D	B
1	2	3	C	F
-	0	E	H	I

A = E
B = F
C =
D =
E =
F =
G =
H = E
I =
- = -

KEYBOARD AND MULTIPLEXING

+5V

R1 THRU R8 464Ω

R1 R2 R3 R4 R5 R6 R7 R8

0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M

IC4 74151 MULTIPLEXER

ENBL

$T2^0$ (B3) $T2^1$ (B3) $T2^2$ (B3)

IC3 7438

$T2^3$ (B3) $T2^4$ (C3) $T2^5$ (B3) $T2^6$ (C3)

IC7 74132

TRANSIENT REMOVER

IC5 7403

R12 8.25K

C6 .22μF 15V

IC7 74132

R13 2.21K

C7 .005μF 50V

R14 8.25K

IC7 74132

MINUS OR ALPHA TIME

IC5 7403

R16 2.21K

DATA GATE

IC2 7438

E9 E10 E7 E8 E3 E5 E4 E6

P2

15 XCLK
13 XDO
11 XD1
8 XD2
10 XD3
9 XD4
12 XD5
14 XD6

DI52-0310 SHEET 1 OF 6

KEYBOARD INHIBIT 3

P2

E2

R15 2.21K

CR1 FD6666

TIME CODE

IC7 74132

IC10 74107

$T2^4$ (C2, C6, C5)

$\overline{T2}^4$ (C6, C2)

R11 2.21K

IC8 74161 BINARY COUNTER

LOAD ENBL CLR CARRY

Z^0 Z^1 Z^2 Z^3

QZ^0 QZ^1 QZ^2 QZ^3

TZ^0 (C2)
TZ^1 (C2) (C3)
TZ^2 (C2, C3)
TZ^3 (C6, C3, C2)

CLOCK

R9 49.9K

R10 301K

C1 470pF

C2 .01μF

IC9 NE555 TIMER

+5V E1

C3 33μF 10V

C4 33μF 10V

C5 .01μF 50V

E11

4 +5V
7 COM

1
2
6
5
N.C.

5. ○ DENOTES WIRE COLORS PER RESISTOR COLOR CODES.
4. ▭ DENOTES ACTUAL LABELING.
3. BAR OVER MNEMONIC DENOTES TRUE-WHEN-LOW.
2. ◊ DENOTES OPEN COLLECTOR.
1. ALL RESISTORS ARE ±1% ¼W.

NOTES: UNLESS OTHERWISE SPECIFIED.

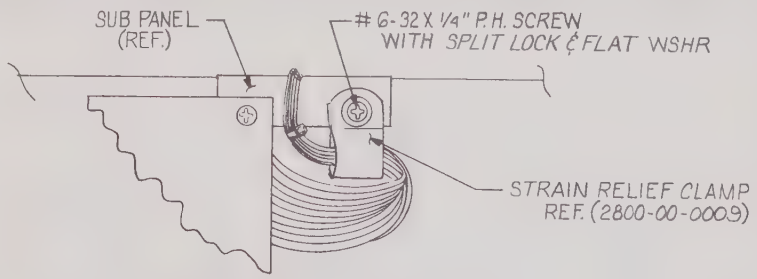
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH: WAVETEK PROCESS
DRAWN BWJ DATE 11/79
TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± .010 ANGLES ± 1 .XX ± .030
DO NOT SCALE DWG
APPD

WAVETEK

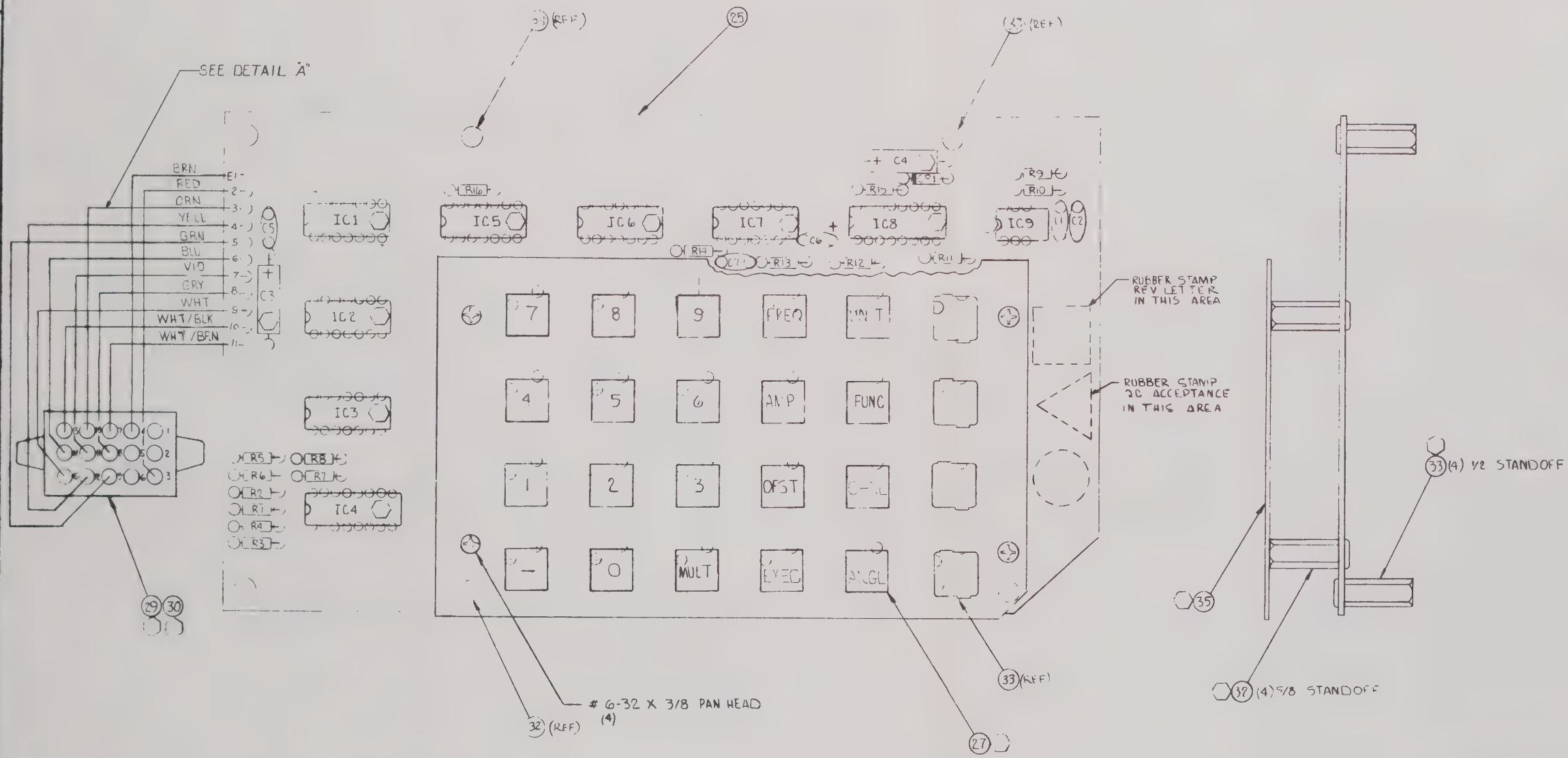
TITLE
SCHEMATIC
KEY BOARD
A6

SIZE B
DWG NO D152-7510
REV A
SCALE NONE
SHEET 1 OF 1

REV	ECN
A	ECN 2531



DETAIL "A"
CABLE CLAMP INSTALLATION
(INSTALL AT CHASSIS LEVEL)



(6) NUMBERS IN HEX AND CIRCLES INDICATE STATION LOCATION.

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN D. BARNETT	DATE 12/1/87	WAVETEK
MATERIAL			TITLE PC ASSY- KEYBOARD
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES 1°		SIZE A2
		SCALE 2/1	152-056

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CARRIER, KEY	158-344	WVTK	1400-00-0783	1
NONE	CAP, CER, MN, .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	2
NONE	CAP, CER, 470PF, 1KV	DD-471	CRL	1500-04-7111	1
NONE	CAP, CER, .005MF, 50V	CK-502	CRL	1500-05-0210	1
NONE	CAP, TANT, 22MF, 15V	196D226X9015KA1	SPRAG	1500-72-2601	1
NONE	CAP, TANT, 33MF, 10V	150D336X9010B2	SPRAG	1500-73-3601	2
NONE	KEY BOARD	158-147	WVTK	1700-00-0109	1
NONE	PLUG, 15PIN	03-09-2151	MOLEX	2100-02-0013	1
NONE	PIN, MALE	02-09-2118	MOLEX	2100-05-0005	11
NONE	CABLE CLAMP	832	SMITH	2800-00-0009	2
NONE	STANDOFF, SWAGE .625 H, .250 HEX 6-32, .062 MAT'L	1531B-5/8	USECO	2800-02-0004	4
NONE	RES, MF, 1/8W, 1%, 2.21K	RN55D-2211F	TRW	4701-03-2211	4
NONE	RES, MF, 1/8W, 1%, 301K	RN55D-3013F	TRW	4701-03-3013	1
NONE	RES, MF, 1/8W, 1%, 464	RN55D-4640F	TRW	4701-03-4640	8
NONE	RES, MF, 1/8W, 1%, 49.9K	RN55D-4992F	TRW	4701-03-4992	1
NONE	RES, MF, 1/8W, 1%, 8.25K	RN55D-8251F	TRW	4701-03-8251	2
NONE	DIODE	1N4148	FAIR	4807-02-6666	1

WAVETEK PARTS LIST | TITLE PCA KEYBOARD | ASSEMBLY NO. 1100-00-0154 PAGE: 1 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	KEY CAP (-)	159-542	WVTK	5103-06-0020	1
NONE	KEY CAP (EXEC) FROM 5103-06-0022	5103-06-0023	WVTK	5103-06-0023	1
NONE	KEYCAP (ANGL) FROM 5103-06-0022	152-557	WVTK	5103-06-0101	1
NONE	KEYCAP (CHNL) FROM 5103-06-0022	152-558	WVTK	5103-06-0102	1
NONE	IC	NE555V	SIG	7000-05-5500	1
NONE	IC	7403	TI	8000-74-0300	1
NONE	IC	7438	TI	8000-74-3800	3
NONE	IC	74107	TI	8007-41-0700	1
NONE	IC	74132	TI	8007-41-3200	1
NONE	IC	74151	TI	8007-41-5100	1
NONE	IC	74161	TI	8007-41-6100	1

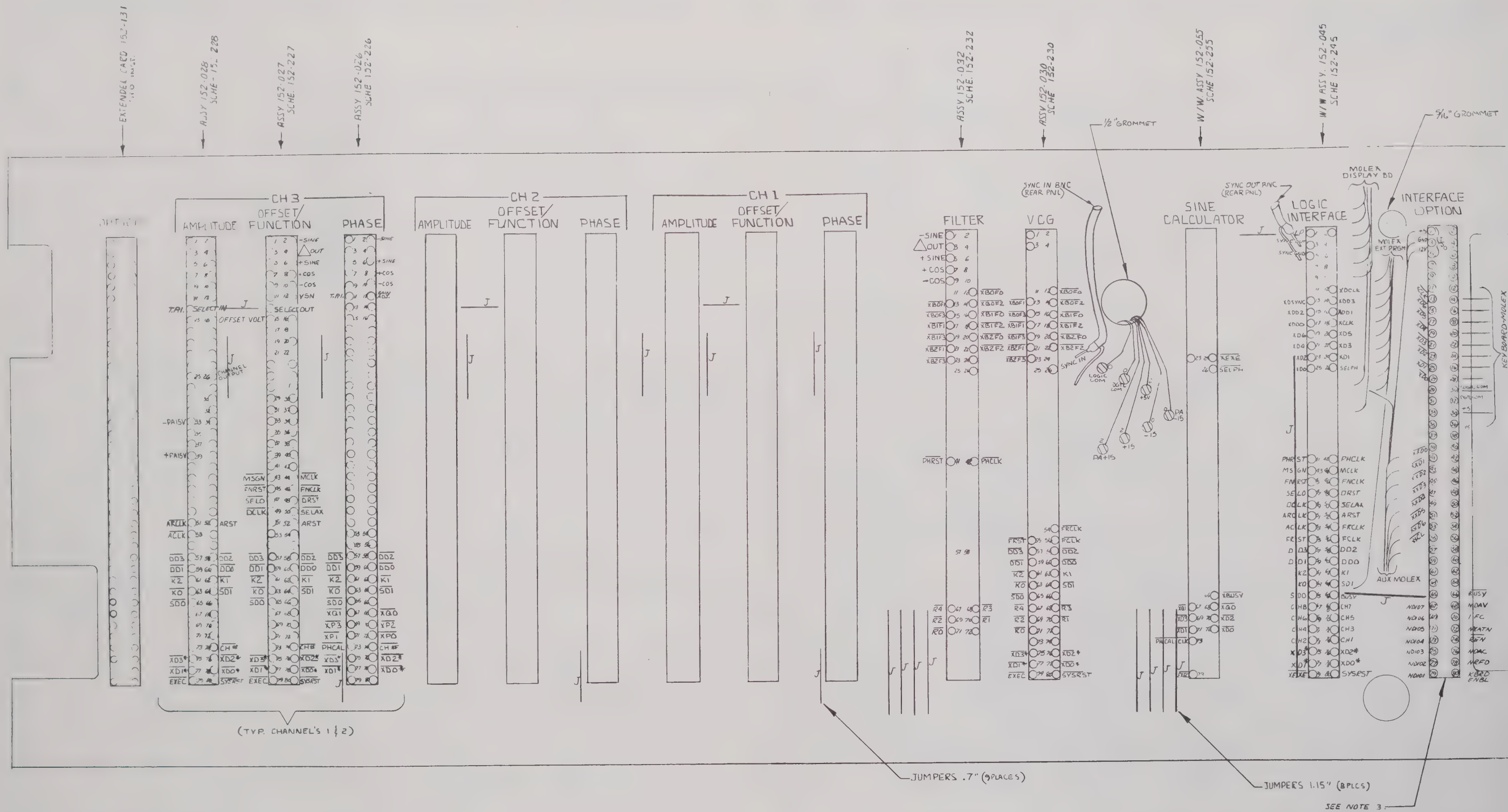
WAVETEK PARTS LIST | TITLE PCA KEYBOARD | ASSEMBLY NO. 1100-00-0154 PAGE 3 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SWITCH, KBD	M61-0100	CHERY	5103-05-0002	20
NONE	KEY CAP (FREQ)	159-522	WVTK	5103-06-0001	1
NONE	KEY CAP (UNIT)	159-523	WVTK	5103-06-0002	1
NONE	KEY CAP (AMPL)	159-524	WVTK	5103-06-0003	1
NONE	KEY CAP (FUNC)	159-525	WVTK	5103-06-0004	1
NONE	KEY CAP (OFST)	159-526	WVTK	5103-06-0005	1
NONE	KEY CAP (MULT)	159-528	WVTK	5103-06-0007	1
NONE	KEY CAP (0)	159-532	WVTK	5103-06-0010	1
NONE	KEY CAP (1)	159-533	WVTK	5103-06-0011	1
NONE	KEY CAP (2)	159-534	WVTK	5103-06-0012	1
NONE	KEY CAP (3)	159-535	WVTK	5103-06-0013	1
NONE	KEY CAP (4)	159-536	WVTK	5103-06-0014	1
NONE	KEY CAP (5)	159-537	WVTK	5103-06-0015	1
NONE	KEY CAP (6)	159-538	WVTK	5103-06-0016	1
NONE	KEY CAP (7)	159-539	WVTK	5103-06-0017	1
NONE	KEY CAP (8)	159-540	WVTK	5103-06-0018	1
NONE	KEY CAP (9)	159-541	WVTK	5103-06-0019	1

WAVETEK PARTS LIST | TITLE PCA KEYBOARD | ASSEMBLY NO. 1100-00-0154 PAGE 2 | REV A

NOTE UNLESS OTHERWISE SPECIFIED

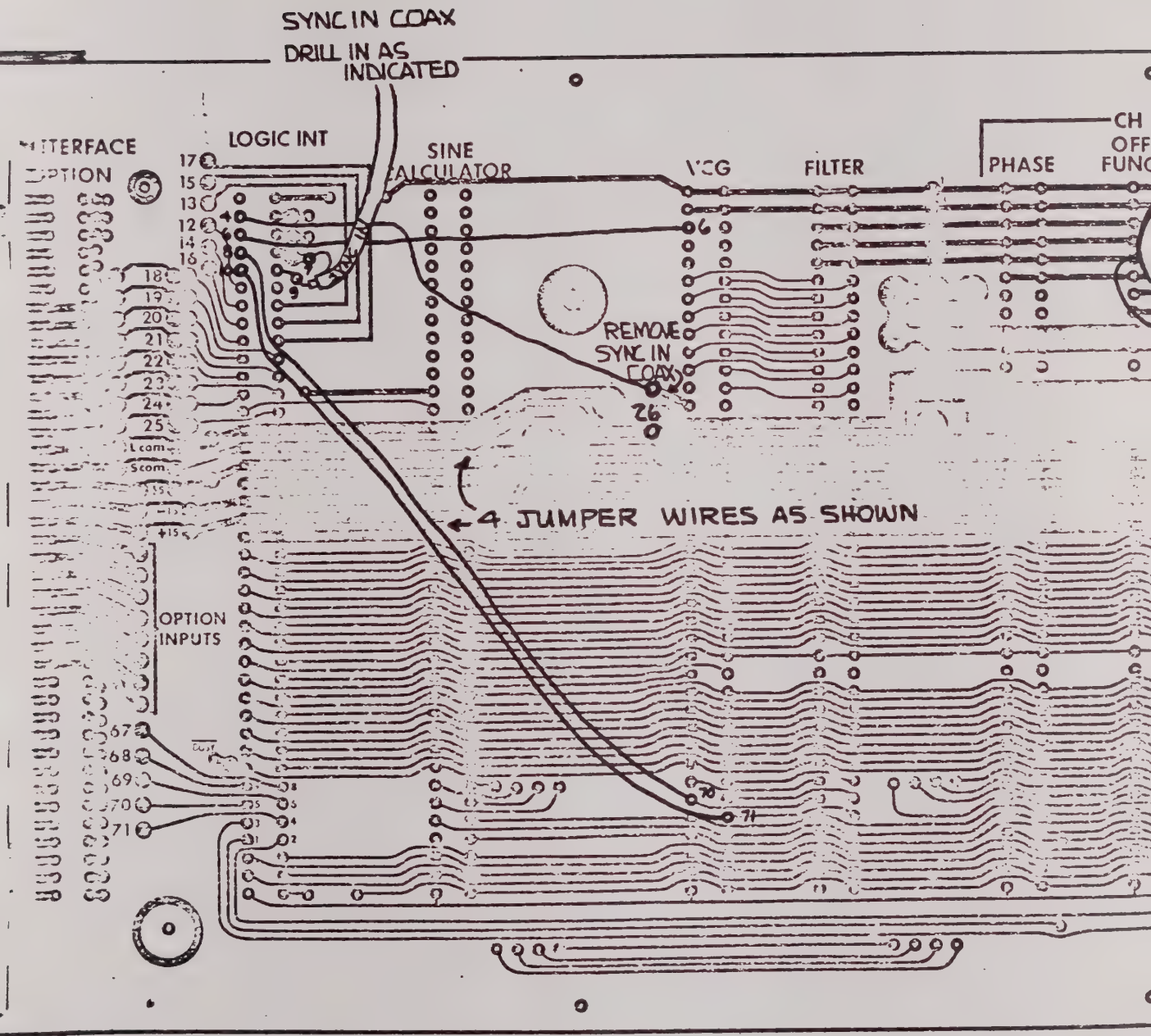
REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST KEYBOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO 1100-00-0154 / REV A
	SCALE		CODE IDENT 23338 / SHEET OF



COMPONENT SIDE

NOTES: 1. ASSY. CALLOUTS FOR REF. ONLY
2 CONN.'S ARE CINCH JONES, 80 PIN CARD CONN., # HW4000. (15 PLCS)
3. ASSY IEC, ISO, TTY/RS232 OPTION BD, NOT INSTALLED ON STD. MACH..
4. ROUTE ALL CABELING TO BRD EDGE, UNDER CONN. MTG HOLES.

WAVETEK
ASSY. MOTHER BD
MODEL 152 STANDARD
D152-034A
1 of 2
3-16-76


SYNC IN COAX
DRILL IN AS INDICATED
LOGIC INT
SINE CALCULATOR
VCG
FILTER
PHASE
REMOVE SYNC IN COAX
4 JUMPER WIRES AS SHOWN
OPTION INPUTS
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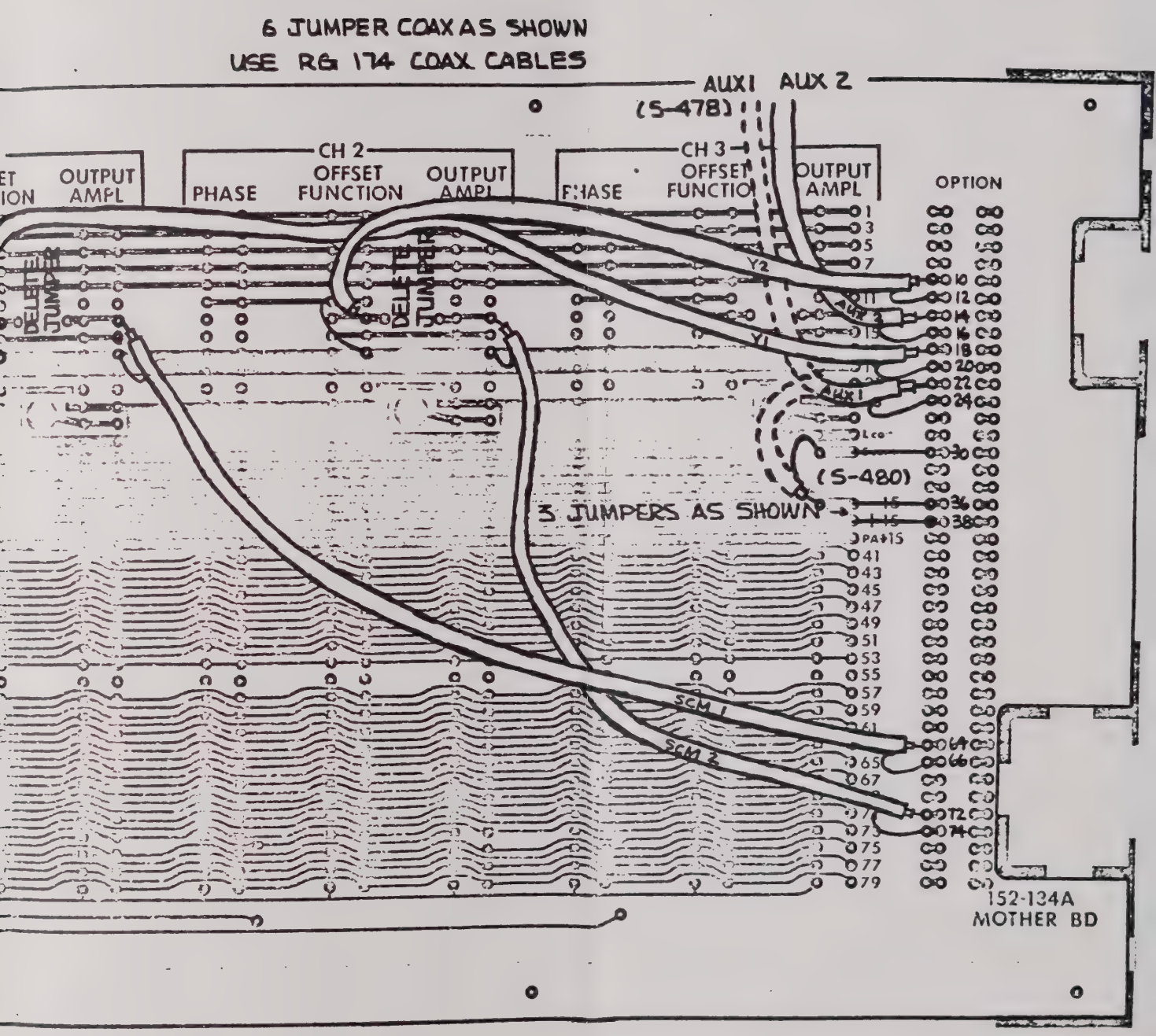

152-S-478

152-S-480

MODIFICATION DRAWING

MOTHER BOARD

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	BLOCK, CABLE MTG	152-328	WVTK	1400-00-8640	3
NONE	MOTHER BOARD	152-134	WVTK	1700-00-0670	1
NONE	CONN, 15PIN	03-09-1151	MOLEX	2100-02-0012	4
NONE	PLUG, 15PIN	03-09-2151	MOLEX	2100-02-0013	1
NONE	CONN	57-20240	AMPH	2100-02-0060	1
NONE	CONN, EDGE, 80 PIN	2HW40D0-111	WINCH	2100-03-0054	15
NONE	PIN, MALE	02-09-2118	MOLEX	2100-05-0005	15
NONE	PIN, FEMALE	02-09-1118	MOLEX	2100-05-0026	60
NONE	TERM	1309B1	USECO	2100-05-0046	10
NONE	CABLE CLAMP	835	SMITH	2800-00-0010	3
NONE	CLAMP, CABLE	837	SMITH	2800-00-0011	2
NONE	RETAINER, SPRING	D-191	WEKSR	2800-09-0007	3
NONE	GROMMET	GB2172/3068	ROYAL	2800-10-0001	1
NONE	GROMMET, RUBBER	2175	SMITH	2800-10-0003	2

WAVETEK PARTS LIST	TITLE PCA MOTHER BD	ASSEMBLY NO. 1100-00-0670 PAGE 1	REV B

DRAWING OWNED BY WAVETEK INC. 1987

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST MOTHER BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO 1100-00-0670 / REV B
	SCALE		CODE IDENT 23330 / SHEET OF

BISHOP GRAPHICS/ACCUPRESS
REORDER NO A-3984

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REV	ECN	BY	DATE	APP
B	SEE ECN #1805	DC	9/82	
C	ECN #770	LTE	5/3/83	

UNIT SELECT

CHANNEL SELECT

POWER UP SYSTEM RESET

DISPLAY CLOCK 5KHZ

	SDI	SDO
AMPL	0	0
FREQ	0	1
OFST	1	0
ANG	1	1

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-29-85	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE SCHEMATIC LOGIC INTERFACE
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO D152-245 REV C
	SCALE	CUSTOMER DRWG NO 23338	SHEET

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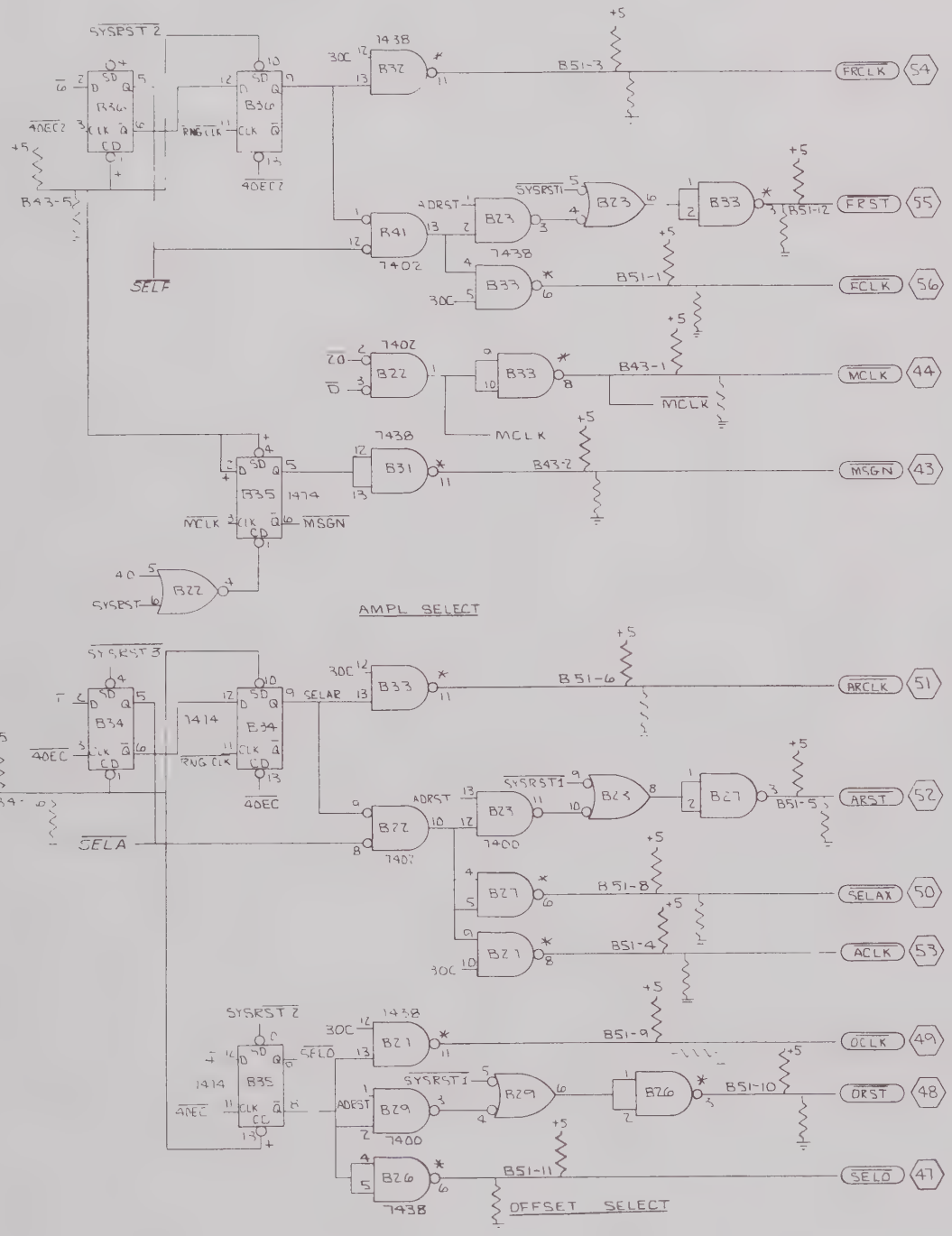
REV	ECN	BY	DATE	APP

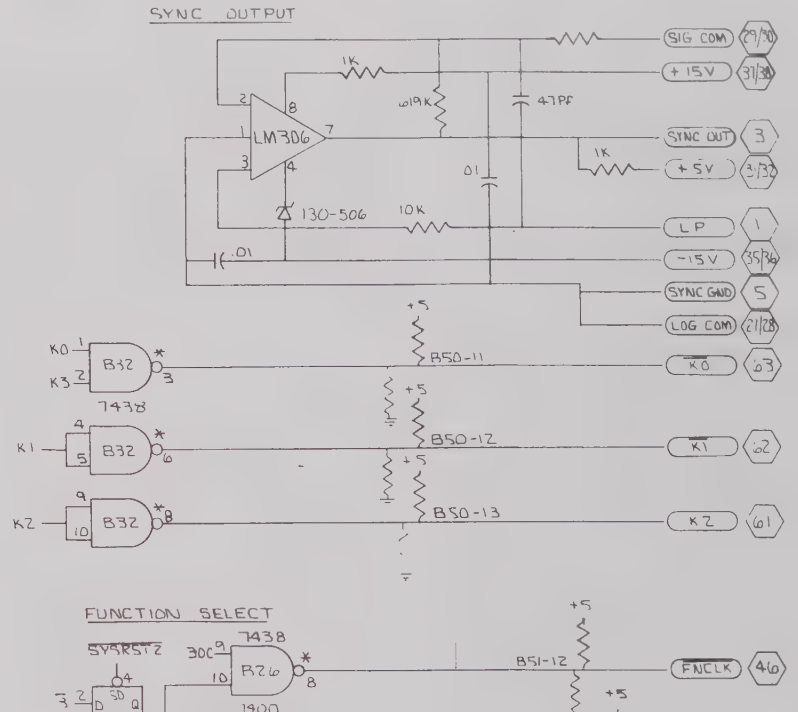
FREQ SELECT



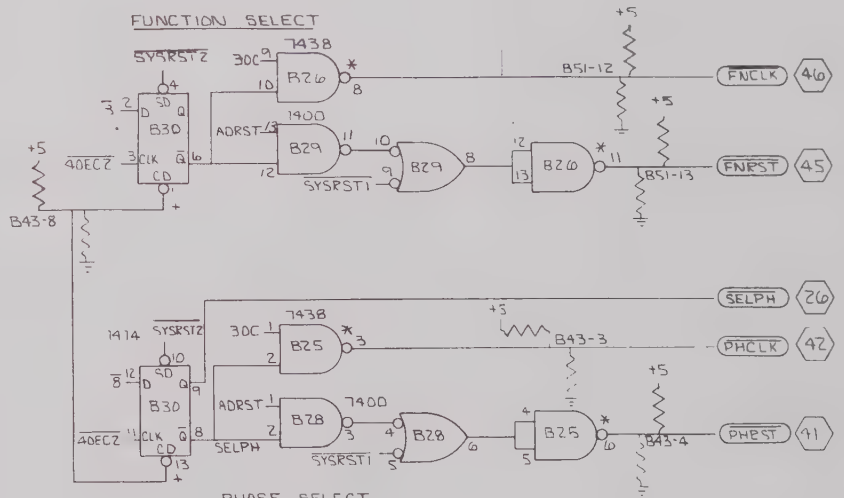
AMPL SELECT

OFFSET SELECT

SYNC OUTPUT



FUNCTION SELECT



PHASE SELECT

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3.25.75	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE SCHEMATIC LOGIC INTERFACE
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1 .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 552	DWG NO D152-245 REV
	SCALE	CODE IDENT 23338	SHEET 2 OF 2

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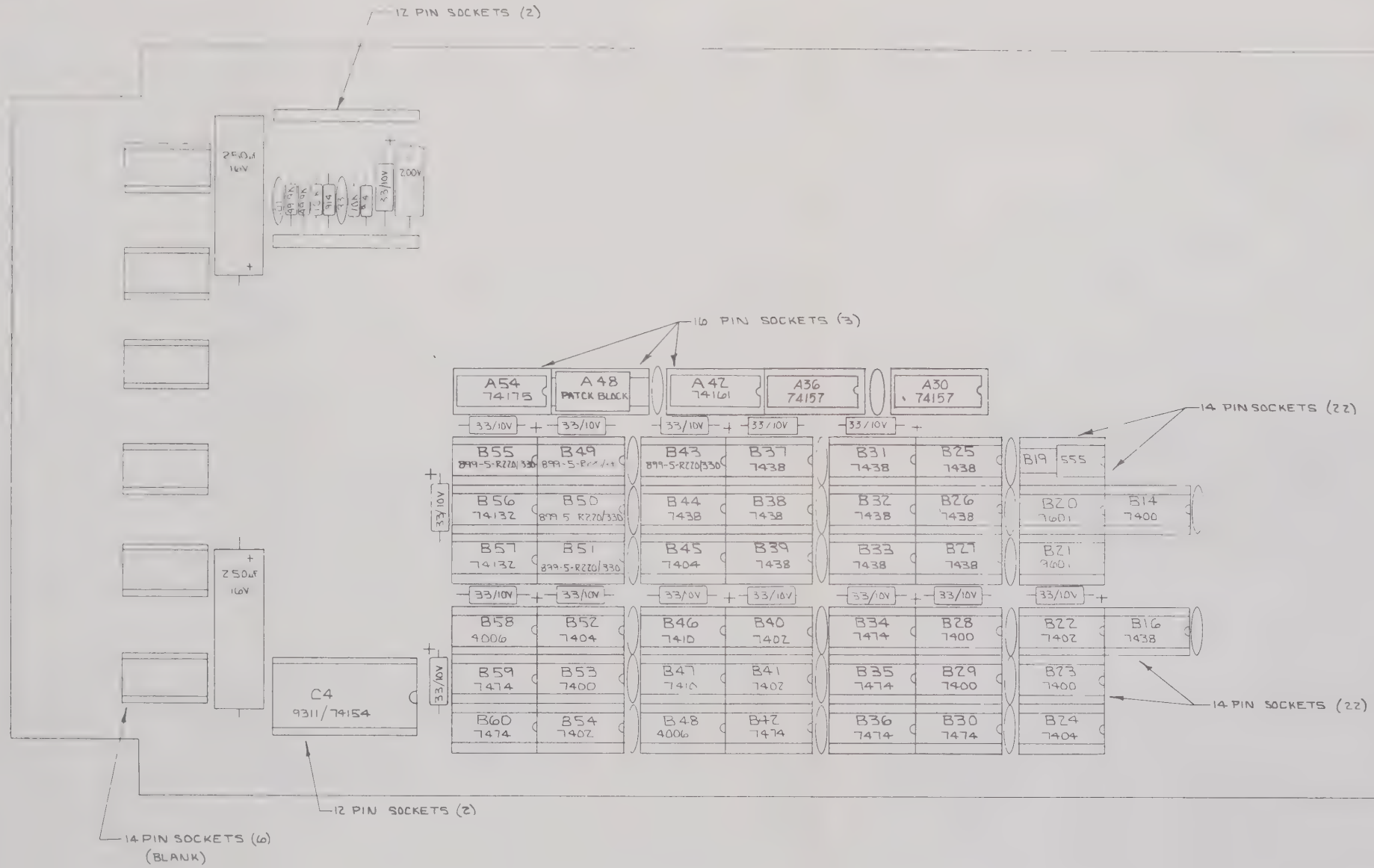
REV	ECN	BY	DATE	APP
C	ECN #2170	WTE	5-21-81	



2. USE WIRE WRAP BD. 152-122
1. ALL CAPS ARE .1uF @ 10V.

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN SA	DATE 3-31-81
MATERIAL	PROJ ENGR	
	RELEASE APPROV	
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES ± XX .030	
	DO NOT SCALE DWG	
	WAVE	

WAVETEK SAN DIEGO, CA

TITLE: ASSEMBLY LOGIC INTERFACE

MODEL NO. 152 | DWG NO. 0152-045 | REV

CUST PART NO. 23338 | SHEET 1 OF 1

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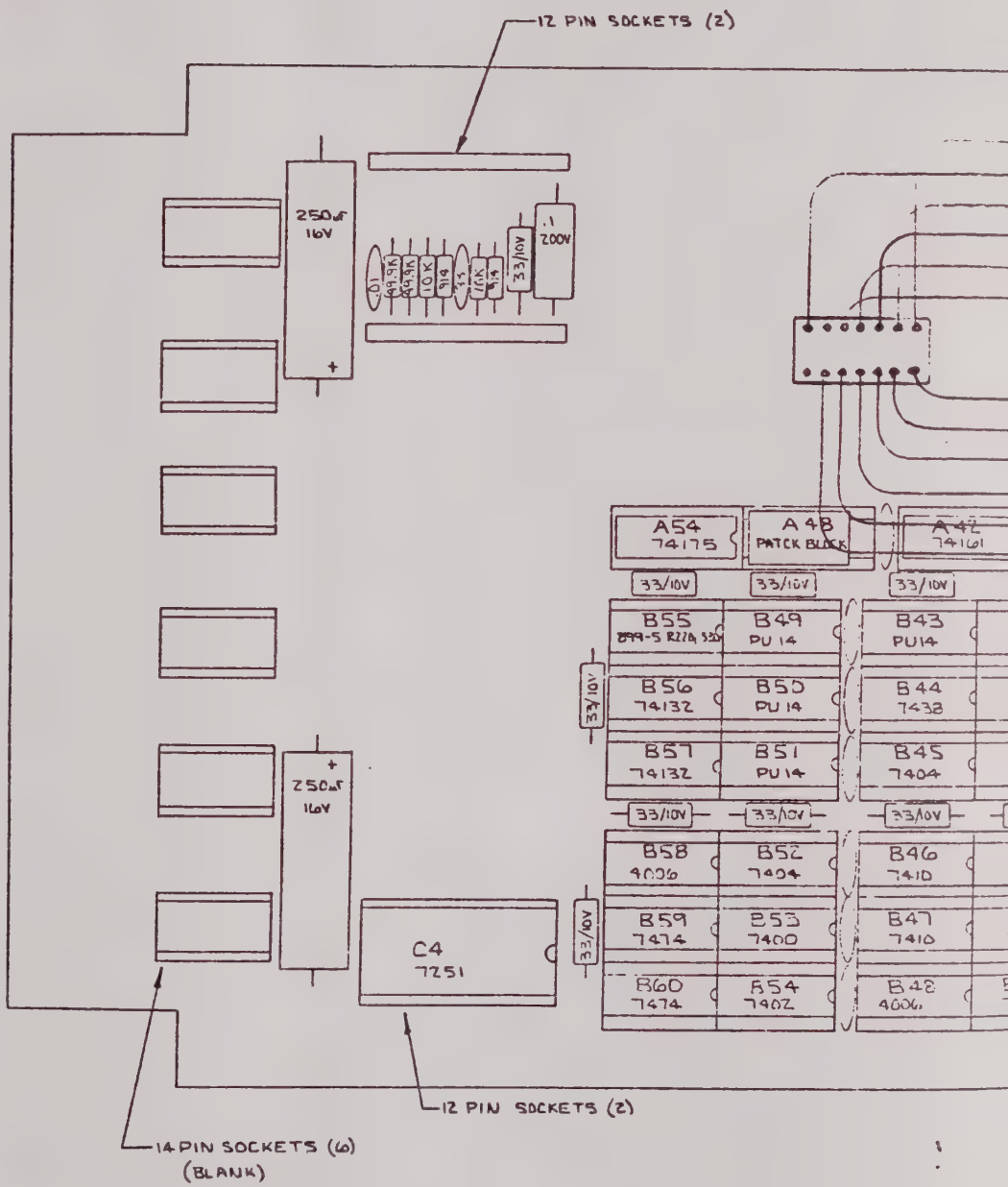
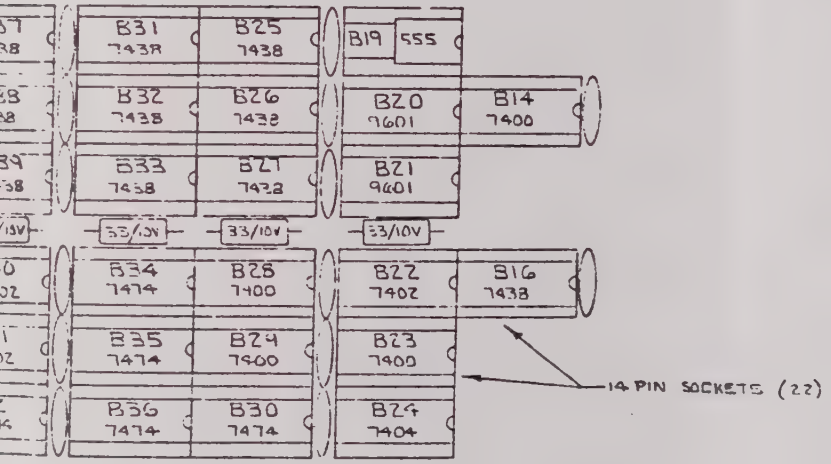


2. USE WIRE WRAP RD. 152-122.
1. ALL CAPS ARE .1µF @ 10V.

NOTE UNLESS OTHERWISE SPECIFIED

PLL SYNC CIRCUIT BOARD 152-043



WAVETEK

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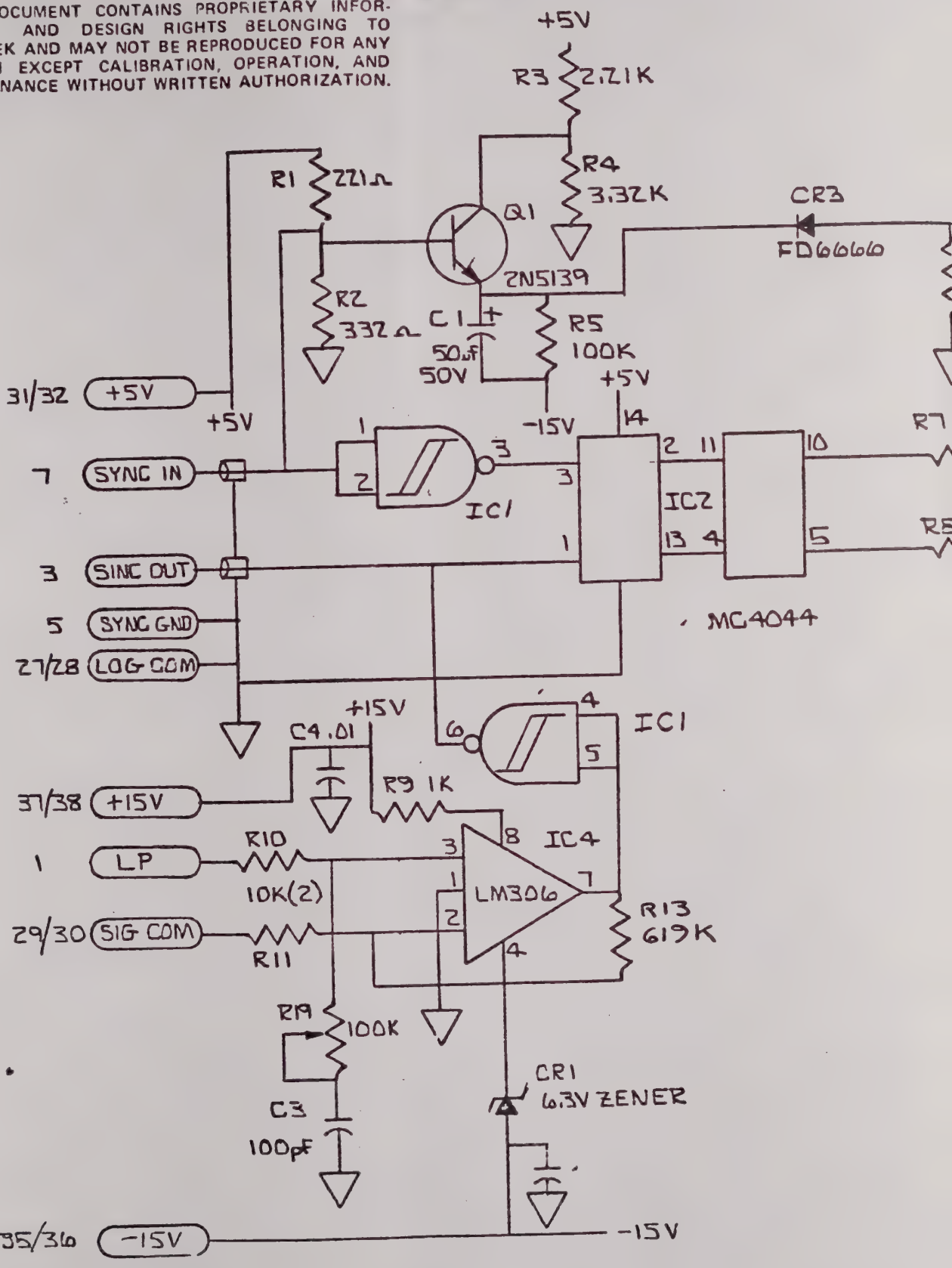
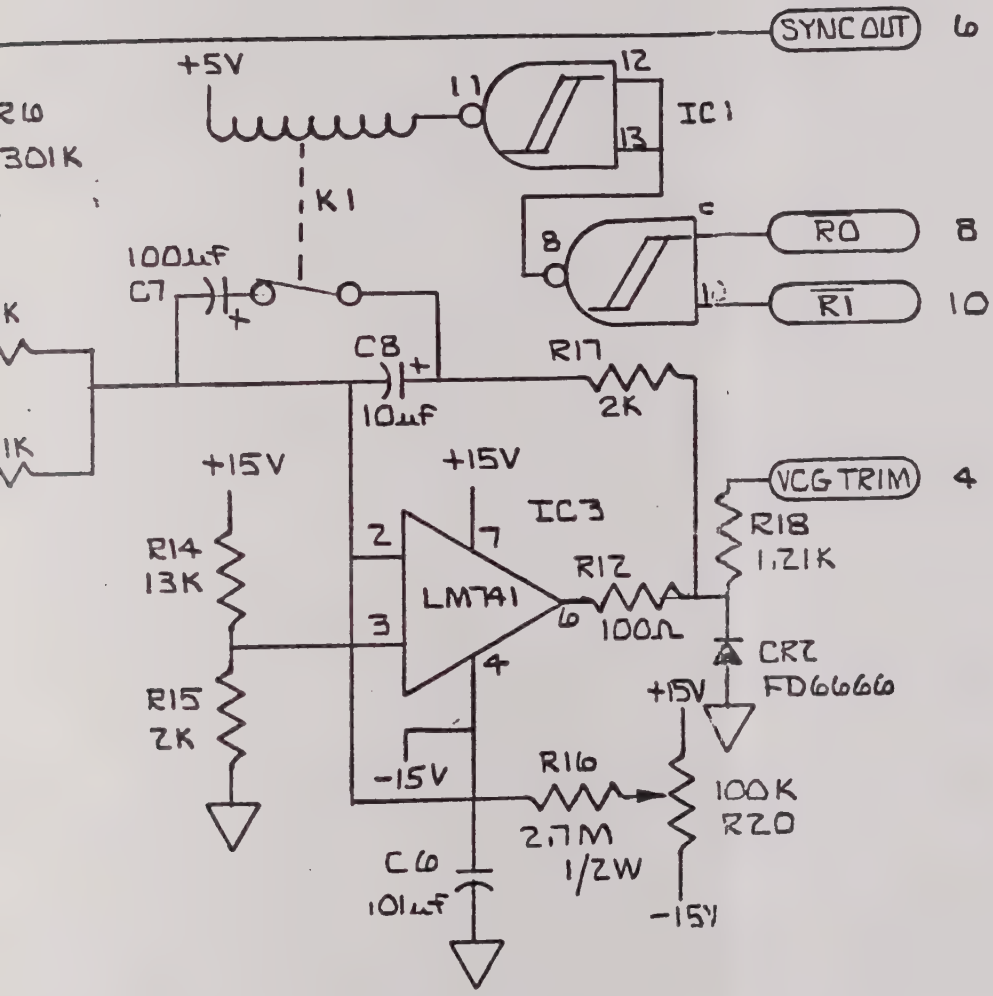


NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 10-16-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE SCHEMATIC PHASE LOCK LOOP
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO. B152-243 REV
	SCALE	CODE IDENT 23338	SHEET OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP, CER, MN, .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	4
NONE	CAP, CER, MON, .1MF, 50V	CAC03Z5U104Z050A	CORNG	1500-01-0405	22
NONE	CAP, CER, 33PF, 1KV	DD-330	CRL	1500-03-3011	1
NONE	CAP, CER, 47PF, 1KV	DD-470 LONG LEAD	CRL	1500-04-7001	1
NONE	CAP, ELECT, 250MF, 16V	500D257G016DF7	SPRAG	1500-32-5101	2
NONE	CAP, TANT, 33MF, 10V	150D336X9010B2	SPRAG	1500-73-3601	15
NONE	SINE CALCULATOR	152-122	WVTK	1700-00-0672	1
NONE	ADAPTER PLUG 14 PIN	6144-14	SAE	2100-02-0042	1
NONE	SKT. IC, 14PIN, WW	CSA2200-14BC	SAE	2100-03-0002	50
NONE	SKT. IC, 16PIN, WW	CSA2200-16BC	SAE	2100-03-0003	5
NONE	SKT. IC, 12PIN, WW	CSA2300-12BC	SAE	2100-03-0004	4
NONE	CONN PIN, MALE (UOM-EA PIN)	CA-S36SP-100-230-830	CA	2100-05-0034	30
NONE	RES, MF, 1/8W, 1%, 1K	RN55D-1001F	TRW	4701-03-1001	2
NONE	RES, MF, 1/8W, 1%, 10K	RN55D-1002F	TRW	4701-03-1002	4
NONE	RES, MF, 1/8W, 1%, 49.9K	RN55D-4992F	TRW	4701-03-4992	2
NONE	RES, MF, 1/4W, 1%, 619K	RN60D-6193F	TRW	4701-13-6193	1
NONE	PES MODULE	899-5-R220/330	BECK	4770-00-0004	5

WAVETEK PARTS LIST	TITLE PCA LOGIC INTERFACE	ASSEMBLY NO. 1100-00-0152	REV A
		PAGE 1	

REORDER FORMS MANUFACTURING INC. 2187

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	DIODE	1N4581	MICRO	4801-01-4581	1
NONE	DIODE	1N4148	FAIR	4807-02-6666	2
NONE	IC	LM306H	NSC	7000-03-0600	1
NONE	IC	NE555V	SIG	7000-05-5500	1
NONE	IC	4006	MOT	8000-40-0600	2
NONE	IC	7400	TI	8000-74-0000	5
NONE	IC	7402	TI	8000-74-0200	4
NONE	IC	7404	TI	8000-74-0400	3
NONE	IC	7410	TI	8000-74-1000	2
NONE	IC	7438	TI	8000-74-3800	11
NONE	IC	7474	TI	8000-74-7400	7
NONE	IC	8311/9311	FAIR	8000-83-1100	1
NONE	IC	8601/9601	FAIR	8000-86-0100	2
NONE	IC	74132	TI	8007-41-3200	2
NONE	IC	74LS157	TI	8007-41-5710	2
NONE	IC	74161	TI	8007-41-6100	1
NONE	IC	74175	TI	8007-41-7500	1

WAVETEK PARTS LIST	TITLE PCA LOGIC INTERFACE	ASSEMBLY NO. 1100-00-0152	REV A
		PAGE 2	

REORDER FORMS MANUFACTURING INC. 2187

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST LOGIC INTERFACE
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		MODEL NO 152 / DWG NO 1100-00-0152 / REV A
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET OF
	SCALE		

BISHOP GRAPHICS/ACCUPRESS REORDER NO A-3884

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REV	ECN	BY	DATE	APP
B	SEE ECN# 1805	DC	9-1-82	
C	# 2065	BSD	2-2-83	
D	# 3486	SC	2-28-83	

74175 (4)

A54 A48 A47 A36

I40 I50 I60 I70
I41 I51 I61 I71
I42 I52 I62 I72
I43 I53 I63 I73

XD3* 7R
XD2* 7I
XD1* 11
XD0* 15
PHICLK 42
PHIRST 41

B50 B50 B49 B51 B26 B29

PHOT

A40 (1/4)

+5V A46-2 A46-3 A46-4

A46-1

CLK3 B43

A35 A41 A47 A53

741066 (4)

LOAD

1C

B49 A0 B49 A1 B49 A2 B49 A3

BUSY B56 B41-1 66 XBUSY
SA0 B56 B41-2 72 XP0
SA1 B50 B45 B56 B41-3 71 XP1
SA2 B50 B45 B56 B41-4 70 XP2
SA3 B55 B41-5 69 XP3
B55 B41-8 67 XQ7
B55 B41-6 68 XQ0
B55 B41-9 73 PHCAL CLK

7438

R33 B46 B45
R0

ST3 B60 74107 B60 QD
1A
RES1

B46 B54
B59 7474 RES2

CLK1 B45

ENZ B39
ENI B39 ENV
B49 START B48

1C 7474 B53 DPOT
CLK3

(SST)

NCRAP B30 B30 B29
PCRAP B30 B29

ADC B29

DPOT

SA0 SA1 SA2 SA3 B14

A21 74283 SB0 SB1 SB2 SB3

B13 A1 B13 A2 B13 A3 B13 A4

A20 74283 S0 S1 S2 S3

S0 B47 S3 B47 B44 B47 B46 CLK3 ST1&9

B53 7474 1C

B47 B47 B47 B48 B45 ADD
SUB B45 ADD

B24 B24 B24 B39 B29 NCRAP
PCRAP

CR

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 9-11-25	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL /	PROJ ENGR		TITLE SCHEMATIC SINE CALCULATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS /	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO D152-255 REV D
	SCALE /	CODE IDENT 23338	SHEET 1 OF 2

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REV	ECN	BY	DATE	APP

1A 7474 B15 B15 DYOUT 100PF 100PF +5V E16 E40 B9-C SISRST CLK0 7431 B21 B21 B21 B21 B16 B16 CLK0 CLK1 CLK2 CLK3 CLK3 MRSET START TC B38 B38 B37 B44 RES2 RES1 RES START A17 74164 B20 B28 CLK2 1A START ENV ENV B23 A16 74151 B28 B23 B23 B23 DONE V8 DONE V8 INDX0 INDX1 LDONE ZOP 74161 A23 A22 74161 1A ST4 B39 B44 1C B43 BUSY LOAD ST0 START B51 B51 B52 BUSY 1 7474 B58 EXE SELPH 26 RES2 XEXE B52 PHOT 1C 1A B43 BUSY 2 B40 B40 R7 R0 B41-11 +5V 79 EXEC XEXE 24 NOTE UNLESS OTHERWISE SPECIFIED

INDX0 INDX1 B22 B22 B22 B22 RCO RCT RC2 7474 B19 B19 START 9316 A18 A12 CLK0 B28 1A 7474 +5V A10-11 A10-10 A10-9 A10-5 A10-4 A10-3 A10-2 A10-1 A11 74157 C3 C2 C1 C0 B34 BSB2 BSB2* BSB0 BSB0* B26 B26 B28 BSA1 BSA0 A24 74153 B34 B42 B27 B33 7474 (2) SIGNX SIGNY ENX B47 CLK2 B34 1A B33 ENY B42 B35 B35 CLKT B34 POA +5V B34 ADD B35 B35 CR B42 ADD B48 PA

+5V +5V +5V
1A A10-15 1B A52-7 1C A46-15

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 9-1175	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL /	PROJ ENGR		TITLE SCHEMATIC SINE CALCULATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS /	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ·010 ANGLES ·1 XX ·030		
	DO NOT SCALE DWG		MODEL NO 152 · DWG NO D152-255 · REV D
	SCALE /		CODE IDENT 23338 · SHEET 2 OF 3

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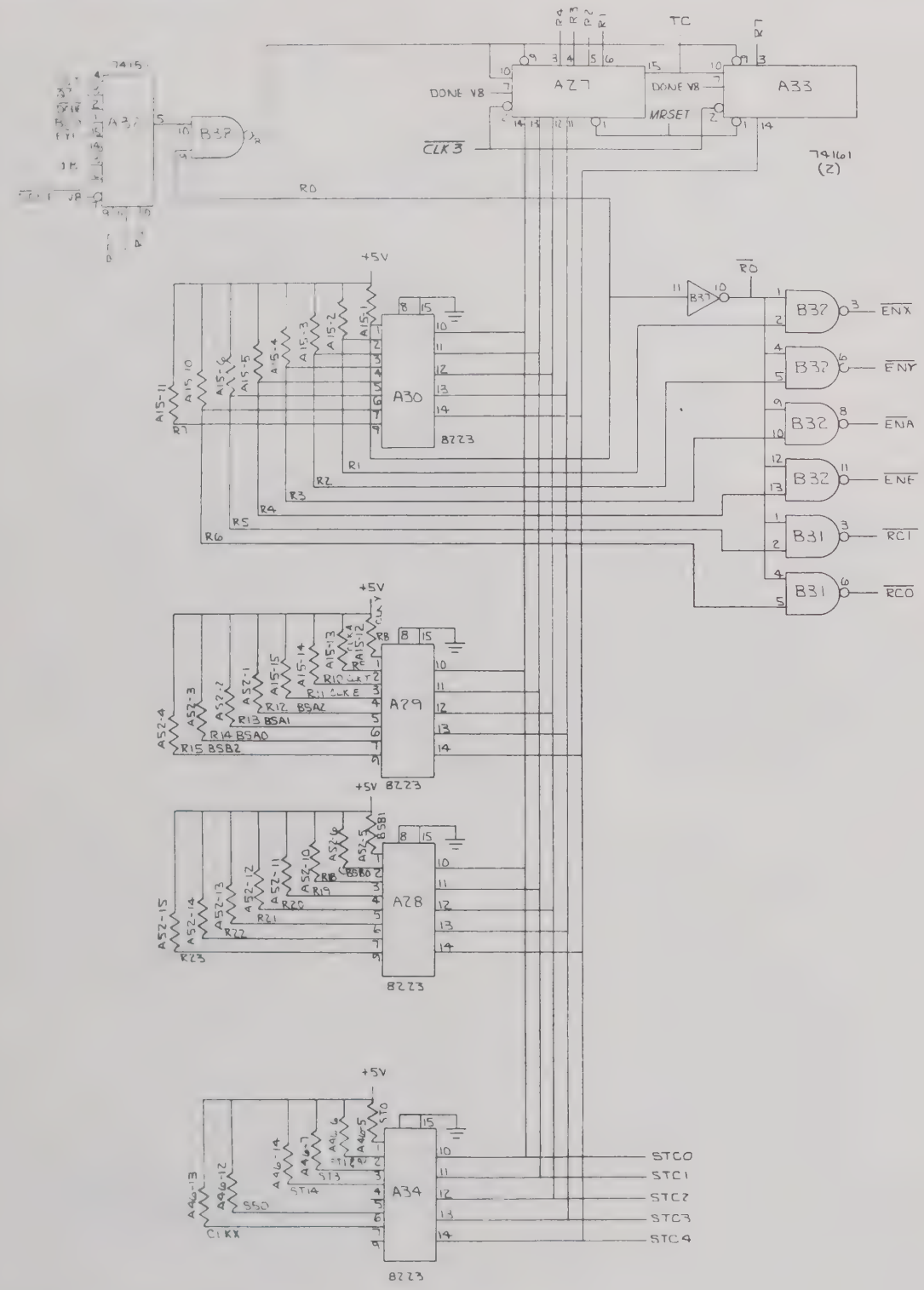
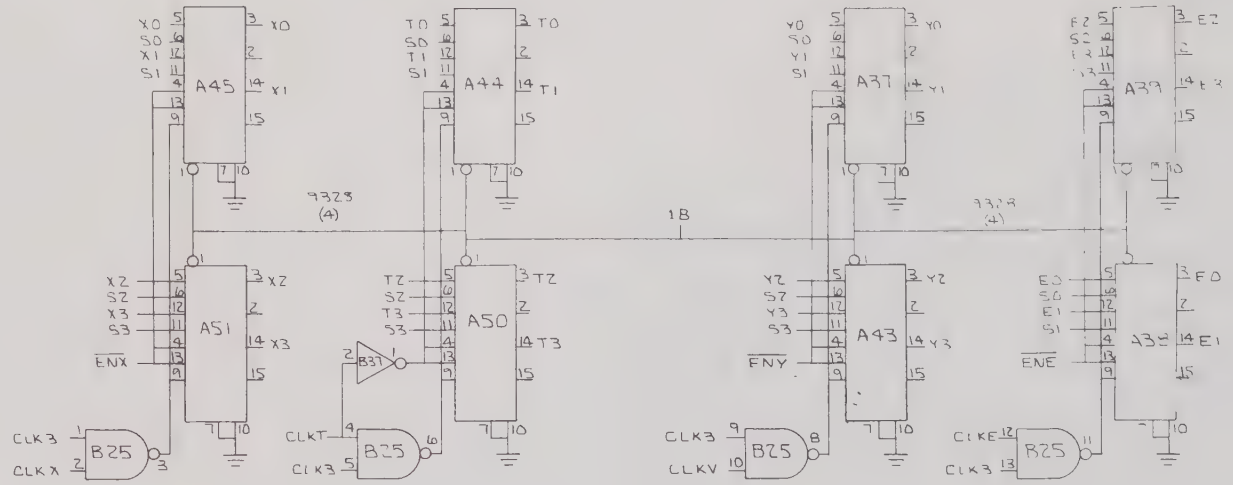
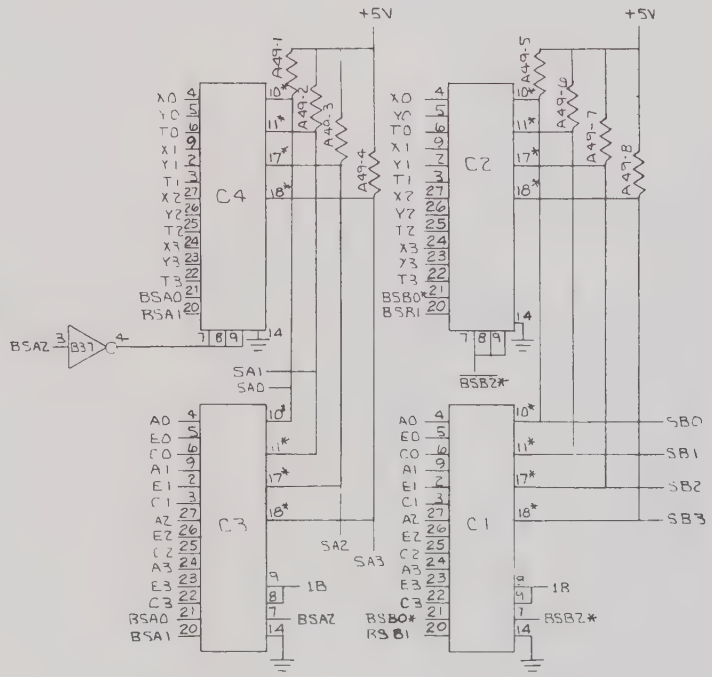


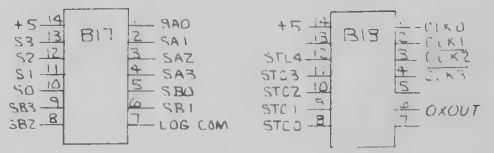




2.2 K DIP PACKAGES

A15	A10
A46	A41
A49	
A52	

TEST SOCKETS



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 4-1275	WAVETEK SAN DIEGO, CALIFORNIA		
MATERIAL /	PROJ ENGR		TITLE SCHEMATIC SINE CALCULATOR		
	RELEASE APPROV				
FINISH WAVETEK PROCESS /	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX ± .030				
	DO NOT SCALE DWG		MODEL NO 157	DWG NO D157-255	REV D
	SCALE /		CODE IDENT 23338	SHEET	

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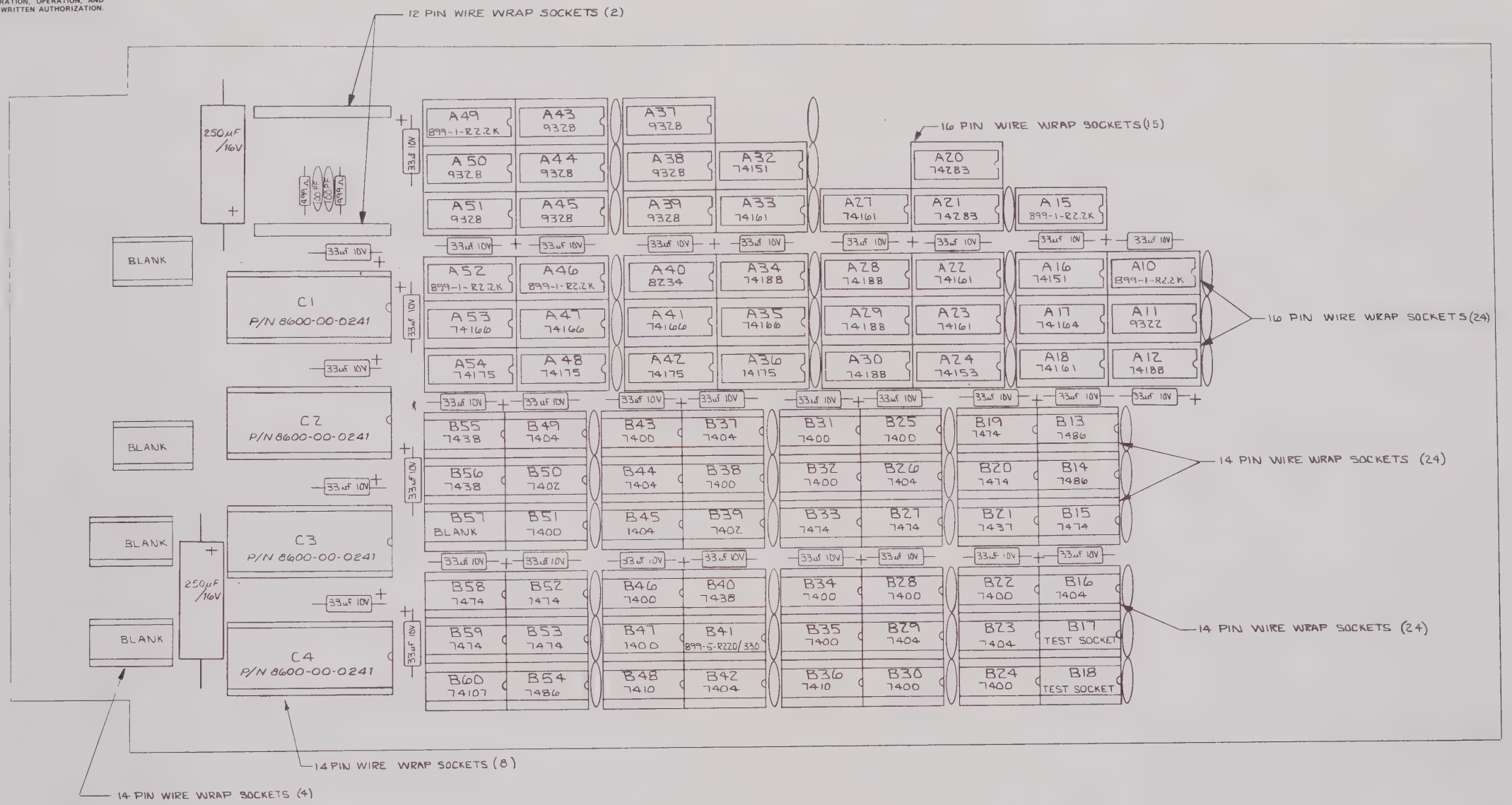
REV	ECN	BY	DATE	APP
B	3486	SC	12-14-82	



2. USE WIRE WRAP BD. 152-122.
1 ALL CAP ARE .1uF 10V
NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BR	DATE 9-1975	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY SINE CALCULATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO D152-055 REV B
	SCALE	CODE IDENT 23338	SHEET 1 OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP, CER, MON, .1MF, 50V	CAC03Z5U104Z050A	CORNG	1500-01-0405	43
NONE	CAP, MICA, 100PF, 500V	DM15-101J	ARCO	1500-11-0100	2
NONE	CAP, ELECT, 250MF, 16V	500D257G016DF7	SPRAG	1500-32-5101	2
NONE	CAP, TANT, 33MF, 10V	150D336X9010B2	SPRAG	1500-73-3601	33
NONE	SINE CALCULATOR	152-122	WVTK	1700-00-0672	1
NONE	SKT, IC, 14PIN, WW	CSA2200-14BC	SAE	2100-03-0002	52
NONE	SKT, IC, 16PIN, WW	CSA2200-16BC	SAE	2100-03-0003	39
NONE	SKT, IC, 12PIN, WW	CSA2300-12BC	SAE	2100-03-0004	10
NONE	SOCKET	CA-S14STL-103WW	CA	2100-03-0068	8
NONE	RES, MF, 1/8, 1%, 499	RN55D-4990F	TRW	4701-03-4990	2
NONE	RES MODULE	899-1-R2.2K	BECK	4770-00-0002	5
NONE	RES MODULE	899-5-R220/330	BECK	4770-00-0004	1
NONE	IC	7400	TI	8000-74-0000	14
NONE	IC	7402	TI	8000-74-0200	2
NONE	IC	7404	TI	8000-74-0400	10
NONE	IC	7410	TI	8000-74-1000	2
NONE	IC	7437	TI	8000-74-3700	1
NONE	IC	7438	TI	8000-74-3800	3

WAVETEK PARTS LIST	TITLE PCA SINE CALCULATOR	ASSEMBLY NO. 1100-00-0672	REV A
		PAGE 1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	7474	TI	8000-74-7400	9
NONE	IC	7486	TI	8000-74-8600	3
NONE	IC	8234	SIG	8000-82-3400	1
NONE	IC	8277	FAIR	8000-82-7700	8
NONE	IC	9322	SIG	8000-93-2200	1
NONE	IC	74107	TI	8007-41-0700	1
NONE	IC	74151	TI	8007-41-5100	2
NONE	IC	74153	TI	8007-41-5300	1
NONE	IC	74161	TI	8007-41-6100	5
NONE	IC	74164	TI	8007-41-6400	1
NONE	IC	74166	TI	8007-41-6600	4
NONE	IC	74175	TI	8007-41-7500	4
NONE	IC, UNPROGRAMMED REF 8500 OR 8600 SERIES PART NUMBERS	SN74S188N	TI	8007-41-8801	5
NONE	IC	74283	TI	8007-42-8300	2
NONE	IC, PROGRAMMED REF 82S100 (WV1)	8600-00-0241	WVTK	8600-00-0241	4

WAVETEK PARTS LIST	TITLE PCA SINE CALCULATOR	ASSEMBLY NO. 1100-00-0672	REV A
		PAGE 2	

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST SINE CALCULATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO 1100-00-0672 REV A
	SCALE	CODE IDENT 23338	SHEET OF

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REV	ECN	BY	DATE	APP

SYNC SW

TP5

+15 SIG GND -15 +6 DGTL GND

C2 100µf@16V · C4 100µf@16V · C5 33µf@10V · C6 .01@50V · C7 33µf@10V · C8 33@10V

200 XB2F1 · 100 XB2F0 · 400 XB2F2 · 200* XB2F3 · 20 XB1F1 · 10 XB1F0 · 4D XB1F2 · 20* XB1F3 · 2 XB0F1 · 1 XB0F0 · 4 XB0F2 · 2* XB0F3 · VCG TRIM · SYNC SW

F.S. FREQ R10 1K · R1 10K · R2 78.7K (6) · R3 · R4 R5 R6 R7 R8 1K · R9 100Ω · R11 100Ω · C45 33pf · IC1 IC2 IC3 IH5010 · LM301 · C9 C10 .01 · R12 R13 78.7K (6) · R14 R15 R16 R17 · R18 R19 R20 33.2Ω (3) · C11 .01 · C1 33pf · IC4 · R21 10Ω · C12 .01 · IC5 · R22 R23 78.7K (6) · R24 R25 R26 R27 · R28 1M 1/2W · Q1 NF510 · R29 4.99K · R30 100K · C14 33pf · IC6 · C15 .01 · R31 1M 1/2W · R32 100K L.F. ADJ · -15

N.A.

R33 30K · R34 100K · C16 1µf ECON · R36 7.32K · R37 1M · R38 150K · C17 1µf 200V · C19 33pf · IC7 · C20 .01 · R35 SYM WAVEFORM ADJ 100K · TP4

TP1 · TP2 · TP3

+15 · R41 15K · C21 .01 · Q3 2N3646 · Q2 2N 3395 · R39 40.2K · IC8 LM310D · C22 33pf · R42 40.2K · Q4 2N5139 · C23 .01 · CR1 CR2 CR3 · C24 1 200V · R40 40.2K

56pf · R47 15K · C25 33pf · C26 5pf · C27 33pf · C28 5pf · R45 4.99K · R46 4.32K · R44 4.99K · R43 4.32K · IC9 CA3080 · IC10 CA3080 · R48 100Ω · C29 .01 · C30 .01 · R49 100Ω · Q5 Q6 2N 3905 (2) · R50 100Ω

R54 4.99K · R58 4.99K · R55 500Ω F.S. SYMMETRY · R53 12.1K · R59 4.99K · IC11 CA3c239E · R51 15K · R52 100Ω · TP6 · Q7 Q8 2N3646 (3) · R56 499K · R57 4.99K · R60 4.99K

C31 33pf · IC12 LM324 · R68 68M 1/2W CNR · R66 100K LF SYM · C32 .01 · C33 15pf · IC13 TP1321 · C34 .1 · C35 .01 · R65 499K

+5 · CR1 CR2 CR3 CR4 CR5 · K1 K2 K3 K4 K5 · C36 C37 C38 C39 C40 1 1 .1 .01 · C41 15-16pf · C42 910pf

71 20 · 70 R1 · 69 R2 · 68 R3 · 67 R4 · 3 OUT

74175 IC15

7404 IC14 LSD · IC16 MSD · XD0* XD1* XD2* XD3* · FCLK 56 · FRST 55 · OF3 OF2 OF1 OF0 · 2F3 2F2 2F1 2F0

IC17 BOF0 BOF1 BOF2 BOF3 · IC18 B1F0 B1F1 B1F2 B1F3 · IC19 B2F0 B2F1 B2F2 B2F3 · CLK CD

ECC 75 · SYSRST 80

7405

BOF: 0 XB0F0 (12) · 1 XB0F1 (13) · 2 XB0F2 (14) · 3 XB0F3 (15)

B1F: 0 XB1F0 (16) · 1 XB1F1 (17) · 2 XB1F2 (18) · 3 XB1F3 (19)

B2F (MSD): 0 XB2F0 (20) · 1 XB2F1 (21) · 2 XB2F2 (22) · 3 XB2F3 (23)

IC34 6.8K

NOTES:
1. * SET OF 3-4.99K ± 0.1%.
2. * SET OF 5 CAPACITORS MATCHED TO ±0.1%.

74175 IC20 IC21 · XD0* XD1* XD2* XD3* · FCLK 54 · BFR0 BFR0 BFR1 BFR2 · +5 · IC35 6.8K · R1 R0 · SDI SDO K2 · 7430 · 7404 · 7438

SDI SDO K2 K1 K0 · 64 65 61 62 63 · 7404 · DE S1 S0 COMPL · IC24 8264 · +5 6.8K IC35

ZF0 ZF1 ZF2 ZF3 IF0 IF1 IF2 IF3 OF0 OF1 OF2 OF3 · A B C

R61 2.2K · R62 2.2K · R63 2.2K · R64 22K · 7438 · 6.8K · 60 DD0 · 59 DD1 · 58 DD2 · 57 DD3 · IC35

LAST REF DESIG USED

CAP	C45
DIODE	CR9
RES	R68
INT CIR	IC35
TRAN	Q9

BFR2 BFR0 BFR1 BFR0 · 7402 · 7438 · 71 K0 · 70 K1 · 69 K2 · 6.8K

REMOVE ALL BURRS AND BREAK SHARP EDGES · MATERIAL · FINISH · UNLESS OTHERWISE SPECIFIED · WAVETEK INDIANA · DRAWN · PROJECTION · TOLERANCES · DO NOT SCALE DRAWING · SIZE · DWG NO

WAVETEK

SCHEMATIC DIAGRAM

VCG BOARD

$478,480

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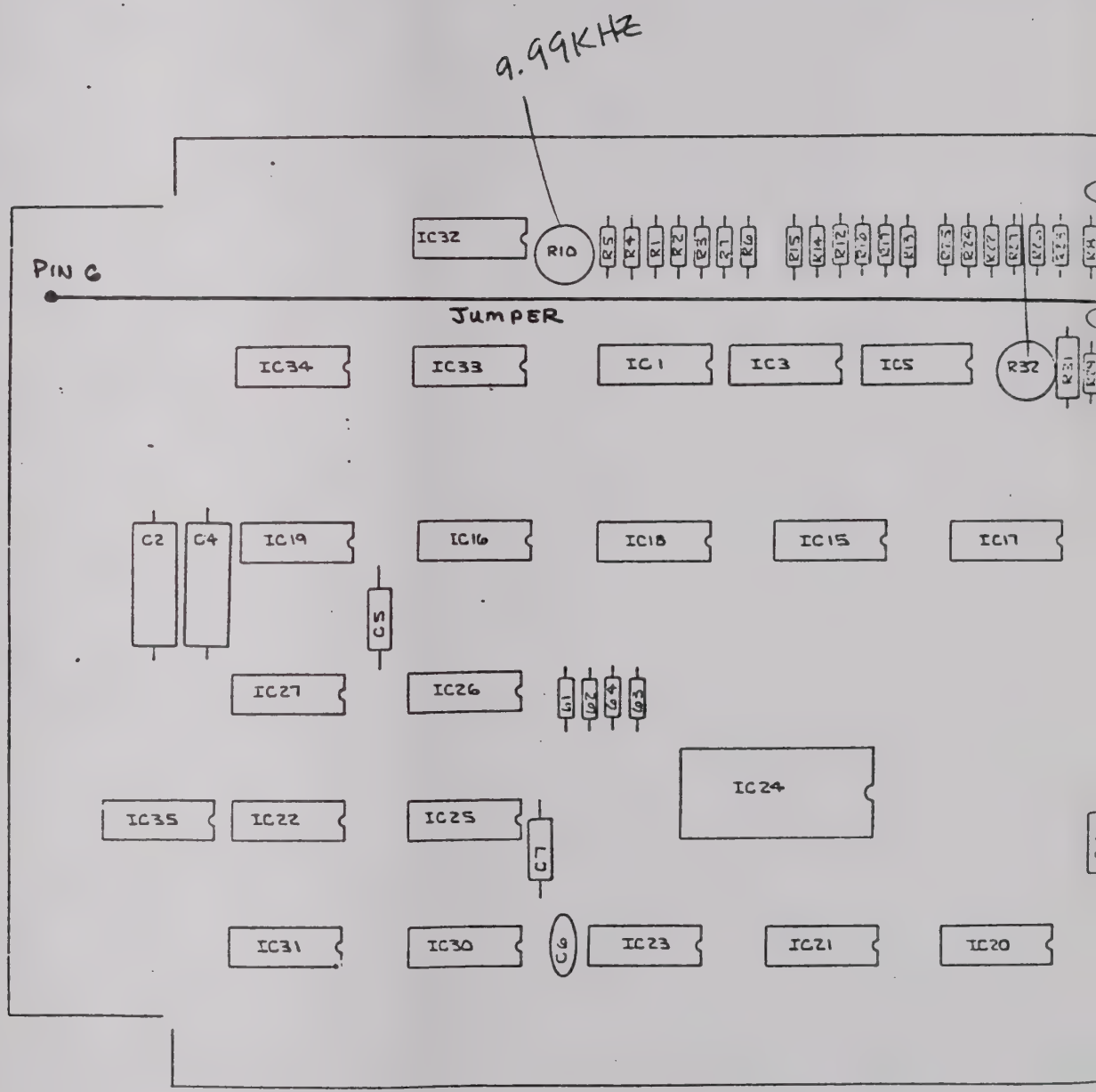
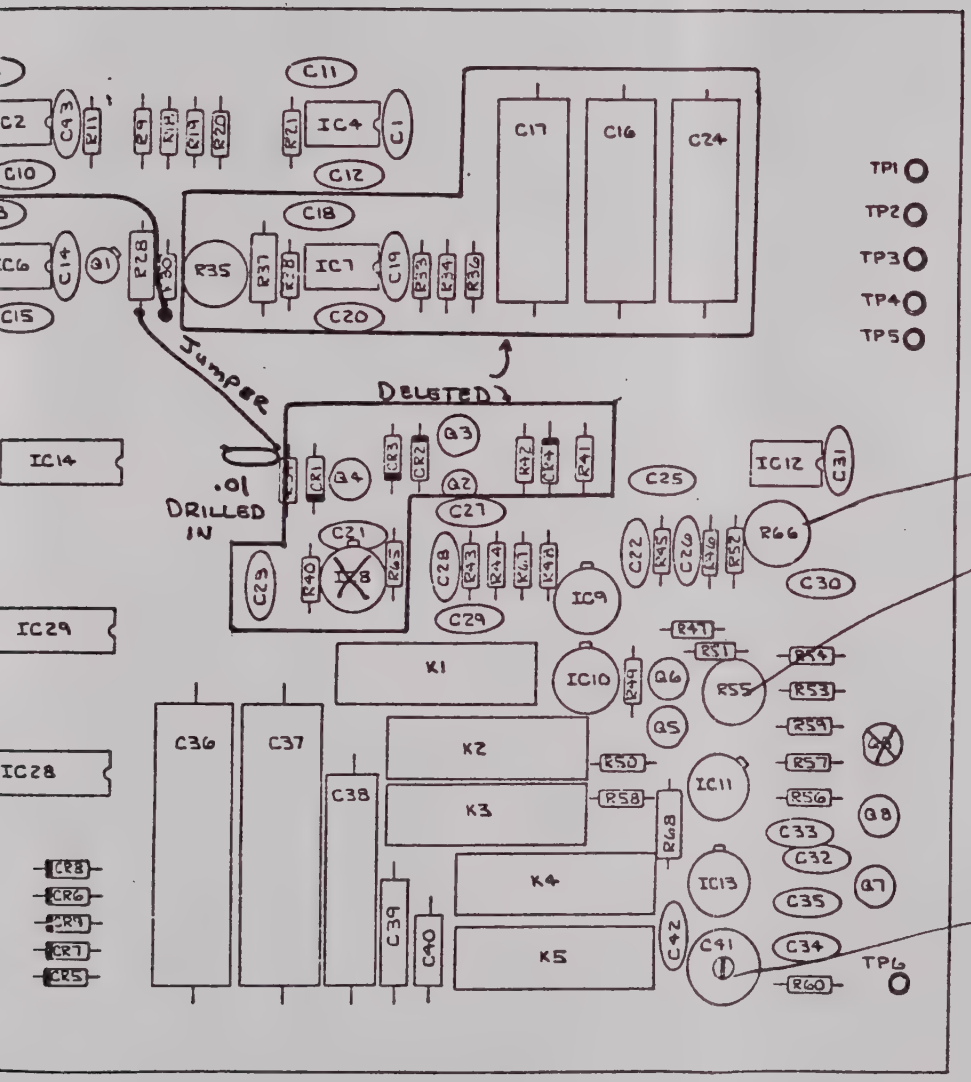
1K





REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 2-23-15	WAVETEK
MATERIAL	SEQUENCE		TITLE
	RELEASE APPROV		ASSEMBLY VCG BOARD
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1° XX ± .030		A2 S478.480
	DO NOT SCALE DWG	MODEL NO	DWG NO REV

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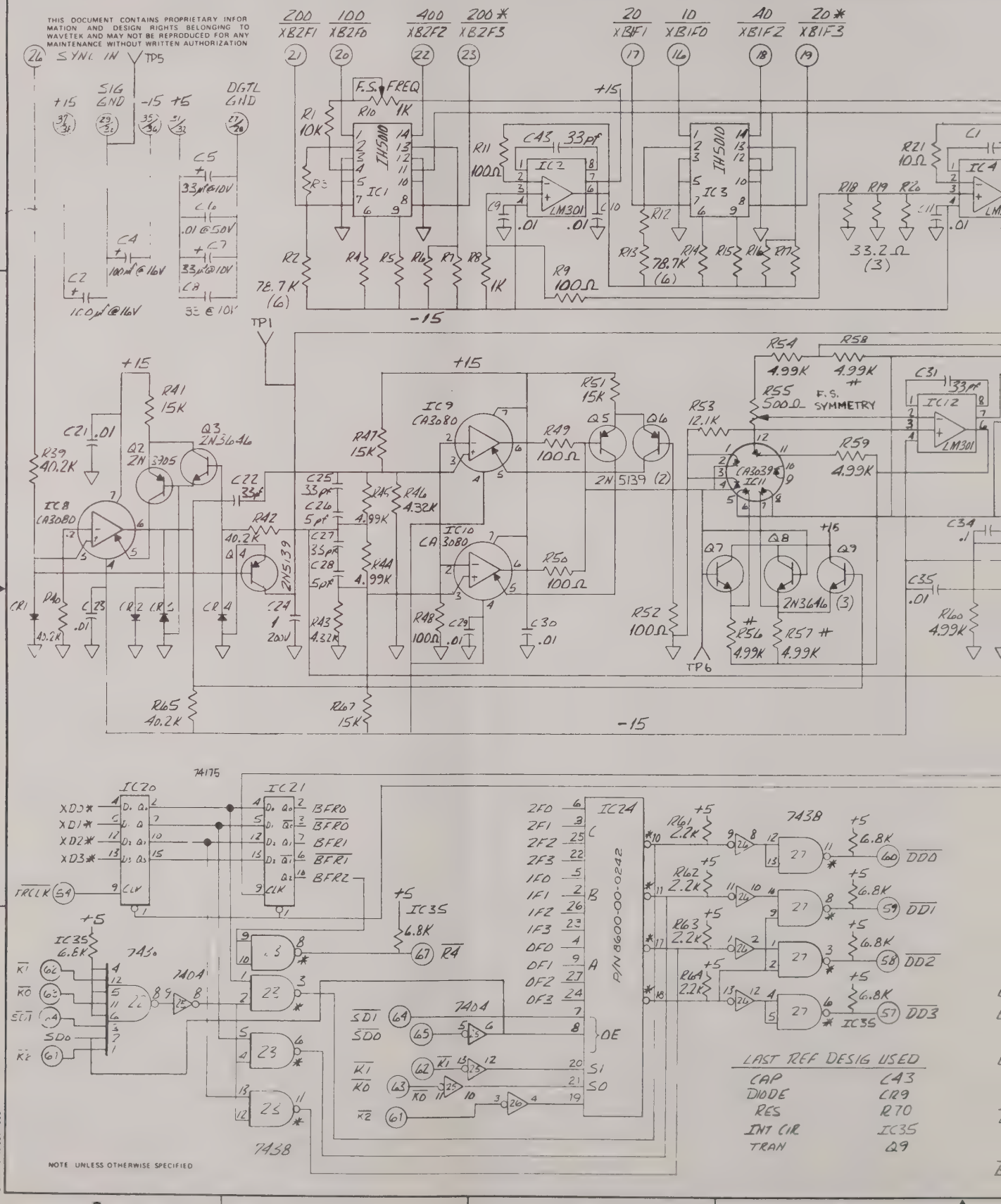

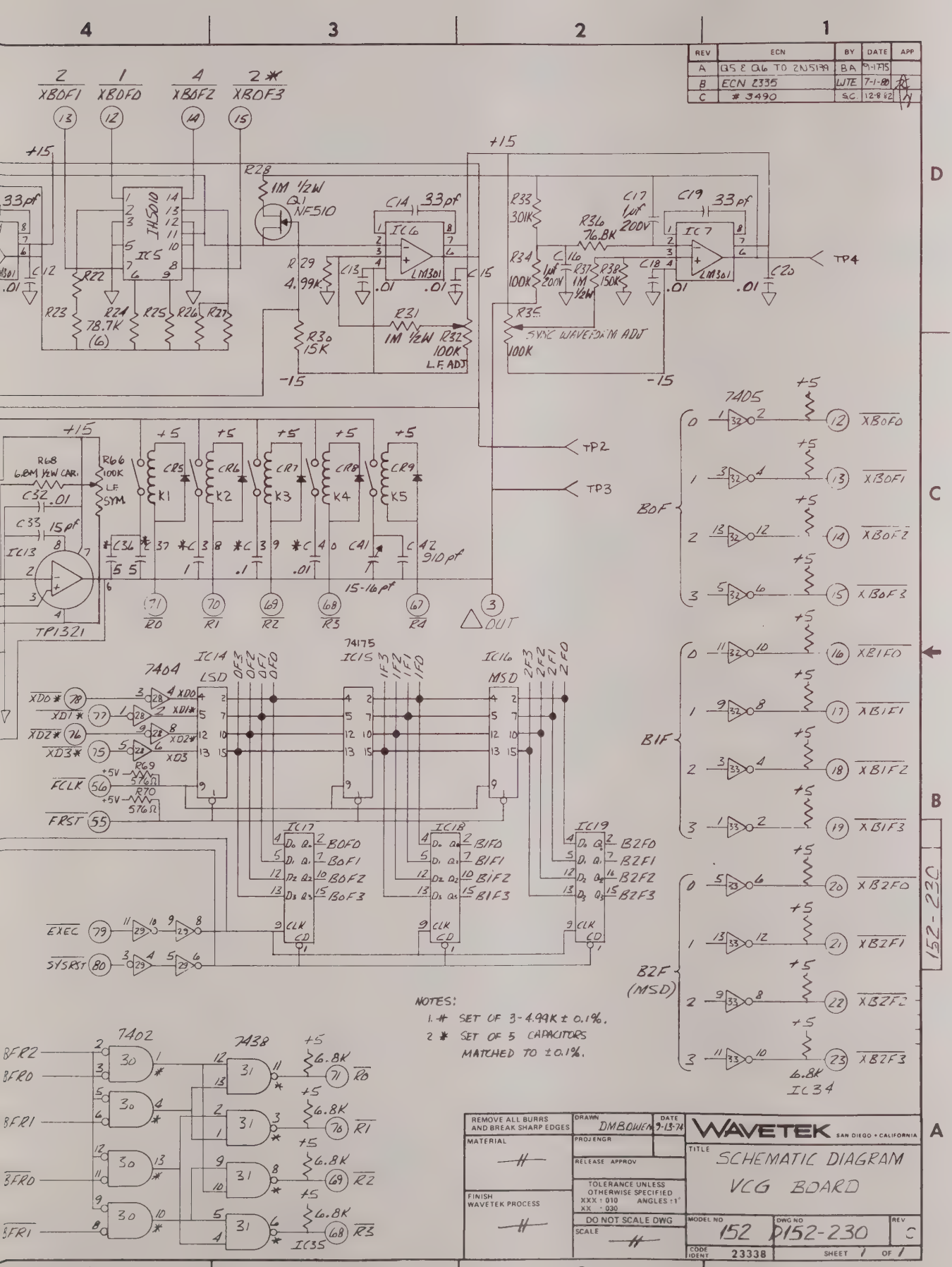
4
3
2
1
REV | ECN | BY | DATE | APP
A | Q5 & Q6 TO 2N5179 | BA | 9-17-75
B | ECN 2335 | WTE | 7-1-80
C | # 3490 | SC | 12-8-82
2 XB0F1
1 XB0F0
4 XB0F2
2* XB0F3
+15
-15
R28 1M 1/2W
Q1 NF510
IC5 IH5010
IC6 LM301
IC7 LM301
C14 33pf
C19 33pf
C17 1uf 200V
C16 1uf 200V
R22 78.7K (6)
R29 4.99K
R30 15K
R31 1M 1/2W
R32 100K L.F. ADJ
R33 301K
R34 100K
R36 76.8K
R37 1M 1/2W
R38 150K
R35 100K SYNC WAVEFORM ADJ
TP4
TP2
TP3
+5
CR5 CR6 CR7 CR8 CR9
K1 K2 K3 K4 K5
R66 100K LF SYM.
R68 6.8M 1/2W CAR.
C32 .01
C33 15pf
C36 C37 C38 C39 C40 C41 C42
15-16pf
910pf
IC13 TP1321
XD0 XD1 XD2 XD3
FCLK
FRST
R69 576Ω
R70 576Ω
7404
IC14 LSD
74175
IC15
IC16 MSD
IC17
IC18
IC19
EXEC
SYSRST
7405
B0F
B1F
B2F (MSD)
XB0F0 XB0F1 XB0F2 XB0F3
XB1F0 XB1F1 XB1F2 XB1F3
XB2F0 XB2F1 XB2F2 XB2F3
6.8K
IC34
NOTES:
1. # SET OF 3-4.99K ± 0.1%.
2 * SET OF 5 CAPACITORS MATCHED TO ±0.1%.
7402
7438
BFR2
BFR0
BFR1
3FR0
3FR1
R0 R1 R2 R3
IC35
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN DMBOWEN
DATE 9-13-74
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED
XXX ± 010 ANGLES ± 1°
XX ± 030
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO • CALIFORNIA
TITLE SCHEMATIC DIAGRAM VCG BOARD
MODEL NO 152
DWG NO 0152-230
REV C
CODE IDENT 23338
SHEET 1 OF 1
152-230

REV	ECN	BY	DATE	APP
A	ECN # 2335	WTE	7-2-80	
B	3490	SC	12-9-82	

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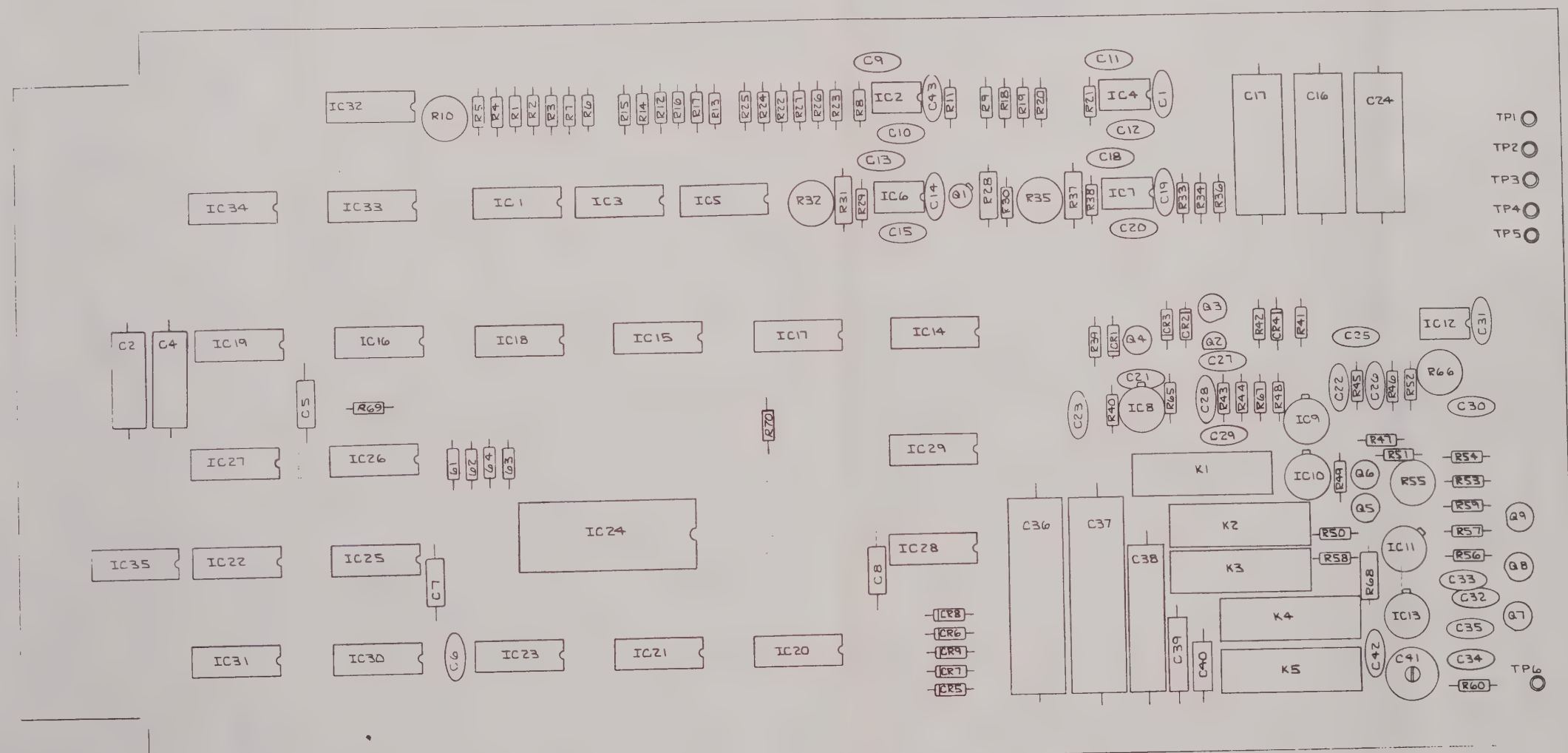

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 12875	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY VCG BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO D152-030 REV B
	SCALE	CODE IDENT 23338	SHEET 1 OF

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP, CER, 5PF 1KV	DD-050	CRL	1500-00-5011	2
NONE	CAP, CER, 10PF, 1KV	DD-100	CRL	1500-01-0011	1
NONE	CAP CER, MN, .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	15
NONE	CAP CER, MON, .1MF, 50V	CAC03Z5U104Z050A	CORNG	1500-01-0405	1
NONE	CAP, CER, 33PF, 1KV	DD-330	CRL	1500-03-3011	8
NONE	CAP, 910PF, 100V, 1%	DM15-911F	ARCO	1500-19-1101	1
NONE	CAP, ELECT, 100MF, 16V	500D107G016DC7	SPRAG	1500-31-0101	2
NONE	CAP, POLYC, 1MF, 100V	210-81C-105F	IMB	1500-41-0504	3
NONE	VARI, 15-60PF, 200V	538-011F1560	ERIE	1500-56-0010	1
NONE	CAP, TANT, 33MF, 10V	150D336X9010B2	SPRAG	1500-73-3601	3
	CAP SET, POLYC MIXED MATCHED SET	130-501-6	WVTK	1509-80-0005	1
NONE	CAP, POLYC, .01MF, 100V PART OF 1509-80-0005 QTY(1)				
NONE	CAP, POLYC, .1MF, 100V PART OF 1509-80-0005 QTY(1)				
NONE	CAP, POLYC, 1MF, 100V PART OF 1509-80-0005 QTY(1)				

WAVETEK PARTS LIST | TITLE PCA VCG | ASSEMBLY NO. 1100-00-0145 PAGE 1 | REV B

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	CAP SET, POLYC MIXED MATCHED SET			1509-80-0005	
NONE	CAP, POLYC, 5MF, 100V PART OF 1509-80-0005 QTY(2)				
NONE	VCG BOARD	152-130	WVTK	1700-00-0145	1
NONE	PIN, MALE	61182-2	AMP	2100-05-0020	6
NONE	RELAY, REED, FORM-A	RA3019-1051	ETROL	4500-00-0007	5
NONE	POT, TRIM, 1K	91AR1K	BECK	4600-01-0209	1
NONE	POT, TRIM, 100K	91AR100K	BECK	4600-01-0402	3
NONE	POT, TRIM, 500	91AR500	BECK	4600-05-0104	1
NONE	RES, C, 1/2W, 5%, 1M	RC20GF-105	STKPL	4700-25-1004	3
NONE	RES, C, 1/2W, 10%, 6.8M	RC20GF-685	STKPL	4700-25-6804	1
NONE	RES, MF, 1/8W, 1%, 100	RN55D-1000F	TRW	4701-03-1000	6
NONE	RES, MF, 1/8W, 1%, 1K	RN55D-1001F	TRW	4701-03-1001	1
NONE	RES MF, 1/8W 1%, 10K	RN55D-1002F	TRW	4701-03-1002	1
NONE	RES, MF, 1/8W, 1%, 100K	RN55D-1003F	TRW	4701-03-1003	1
NONE	RES, MF, 1/8W, 1%, 10	RN55D-10R0F	TRW	4701-03-1009	1
NONE	RES, MF, 1/8W, 1%, 12.1K	RN55D-1212F	TRW	4701-03-1212	1

WAVETEK PARTS LIST | TITLE PCA VCG | ASSEMBLY NO. 1100-00-0145 PAGE 2 | REV B

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES, MF, 1/8W, 1%, 15K	RN55D-1502F	TRW	4701-03-1502	5
NONE	RES, MF, 1/8W, 1%, 150K	RN55D-1503F	TRW	4701-03-1503	1
NONE	RES, MF, 1/8W, 1%, 2.21K	RN55D-2211F	TRW	4701-03-2211	4
NONE	RES, MF, 1/8W, 1%, 301K	RN55D-3013F	TRW	4701-03-3013	1
NONE	RES, MF, 1/8W, 1%, 33.2	RN55D-33R2F	TRW	4701-03-3329	3
NONE	RES, MF, 1/8W, 1%, 40.2K	RN55D-4022F	TRW	4701-03-4022	4
NONE	RES, MF, 1/8W, 1%, 4.32K	RN55D-4321F	TRW	4701-03-4321	2
NONE	RES, MF, 1/8W, 1%, 4.99K	RN55D-4991F	TRW	4701-03-4991	6
NONE	RES, MF, 1/8W, 1%, 576	RN55D-5760F	TRW	4701-03-5760	2
NONE	RES, MF, 1/8W, 1%, 76.8K	RN55D-7682F	TRW	4701-03-7682	1
NONE	RES, MF, 1/8W, 1%, 78.7K	RN55D-7872F	TRW	4701-03-7872	18
NONE	RES MODULE	899-1-R0.0K	BECK	4770-00-0003	2
NONE	RES, SET, 3-4.99K, 1/8W QTY 3 4701-03-4991	4789-00-0046	WVTK	4789-00-0046	1
NONE	DIODE	1N4148	FAIR	4807-02-6666	9
NONE	TRANS	2N3646	NSC	4901-03-6460	4
NONE	TRANS	2N3905	ITT	4901-03-9050	1
NONE	TRANS	2N5139	FAIR	4901-05-1390	3

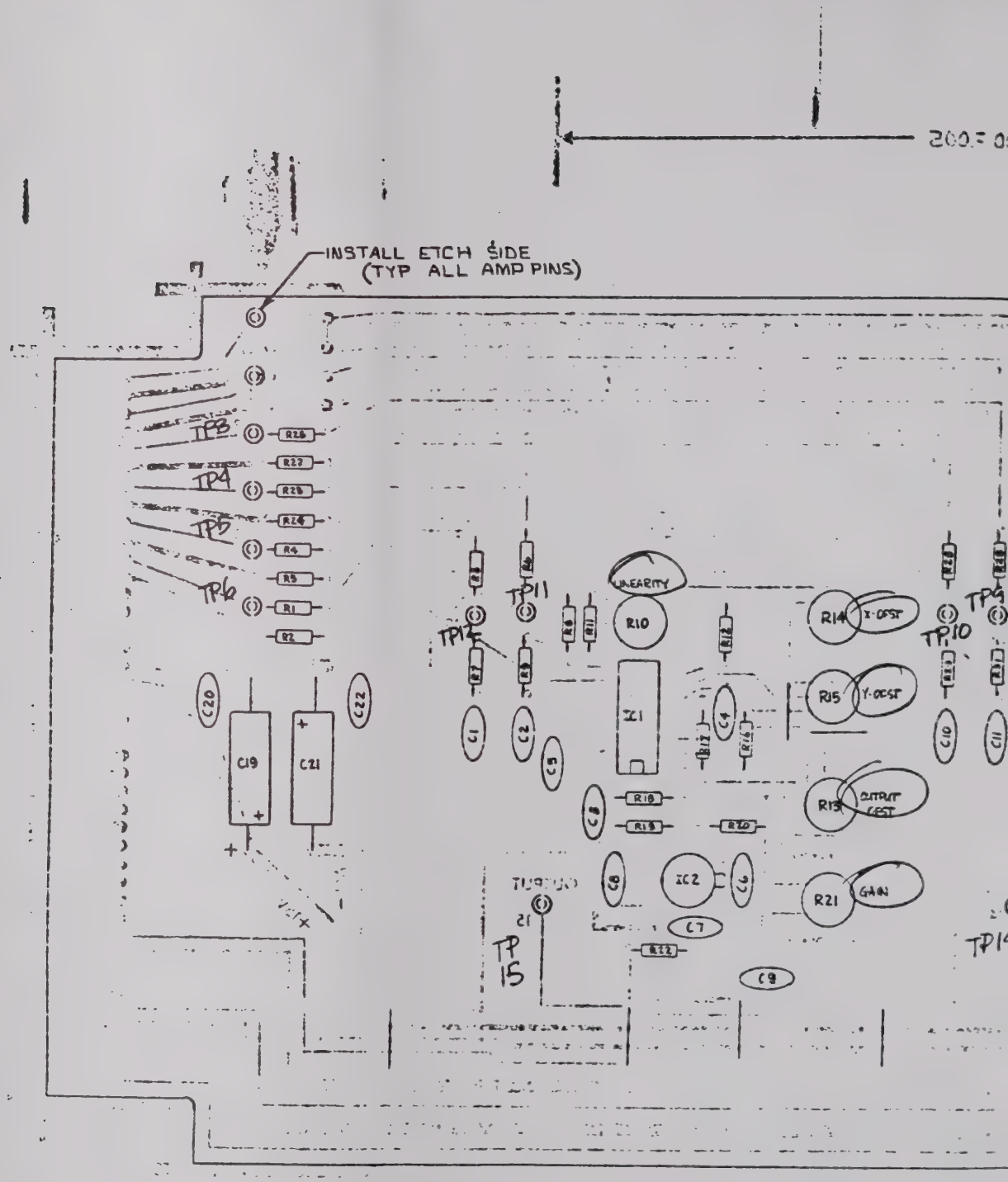
WAVETEK PARTS LIST | TITLE PCA VCG | ASSEMBLY NO. 1100-00-0145 PAGE 3 | REV B

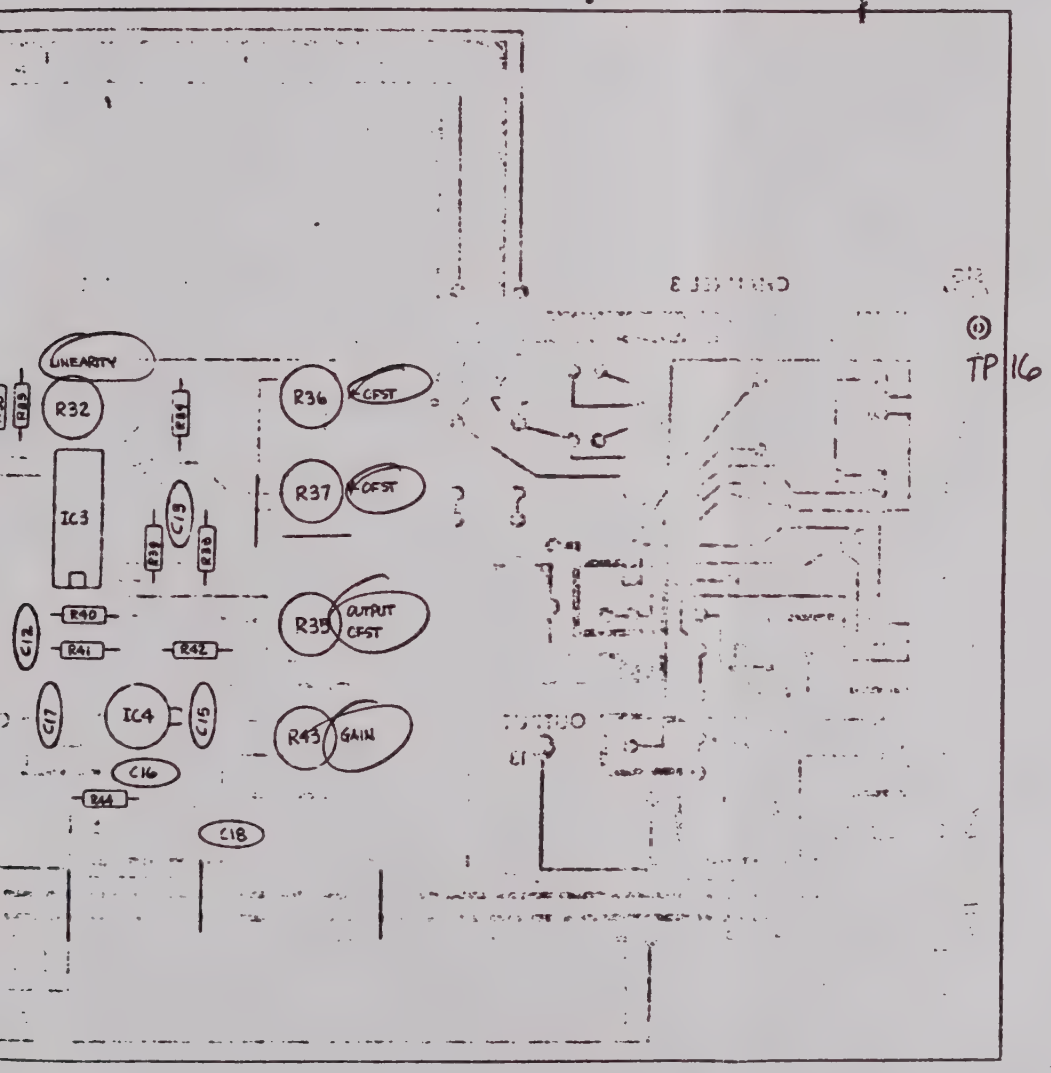
REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	TRANS	NF-510	NSC	4902-00-5100	1
NONE	IC	LM 301AN	NSC	7000-03-0100	5
NONE	IC	TP1321	TLDYN	7000-13-2100	1
NONE	IC	CA-3080	RCA	7000-30-8000	3
NONE	IC	5010	INTSL	7000-50-1000	3
NONE	IC, CLASS I, CA-3039 QTY 1 7000-30-3900	130-501-18	WVTK	7200-00-0004	1
NONE	IC	7402	TI	8000-74-0200	1
NONE	IC	7404	TI	8000-74-0400	4
NONE	IC	7405	TI	8000-74-0500	2
NONE	IC	7430	TI	8000-74-3000	1
NONE	IC	7438	TI	8000-74-3800	3
NONE	IC	74175	TI	8007-41-7500	8
NONE	IC, PROGRAMMED REF 825100 (WV2)	8600-00-0242	WVTK	8600-00-0242	1

WAVETEK PARTS LIST | TITLE PCA VCG | ASSEMBLY NO. 1100-00-0145 PAGE 4 | REV B

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST VCG
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		MODEL NO 152 / DWG NO 1100-00-0145 / REV B
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET OF
	SCALE		

NOTE UNLESS OTHERWISE SPECIFIED


INSTALL ETCH SIDE
(TYP ALL AMP PINS)
TP3
TP4
TP5
TP6
TP11
TP12
TP10
TP15
R10
R14
X-OFST
R15
Y-OFST
R13
OUTPUT OFST
R21
GAIN
IC1
IC2
C19
C21
C20
C22



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK
MATERIAL	PROJECTION		TITLE ASSEMBLY A8 X-Y MULTIPLIER ED.
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1		
	DO NOT SCALE DWG		MODEL NO 182-5-5-1 DWG NO 2182-04 REV
	SCALE		

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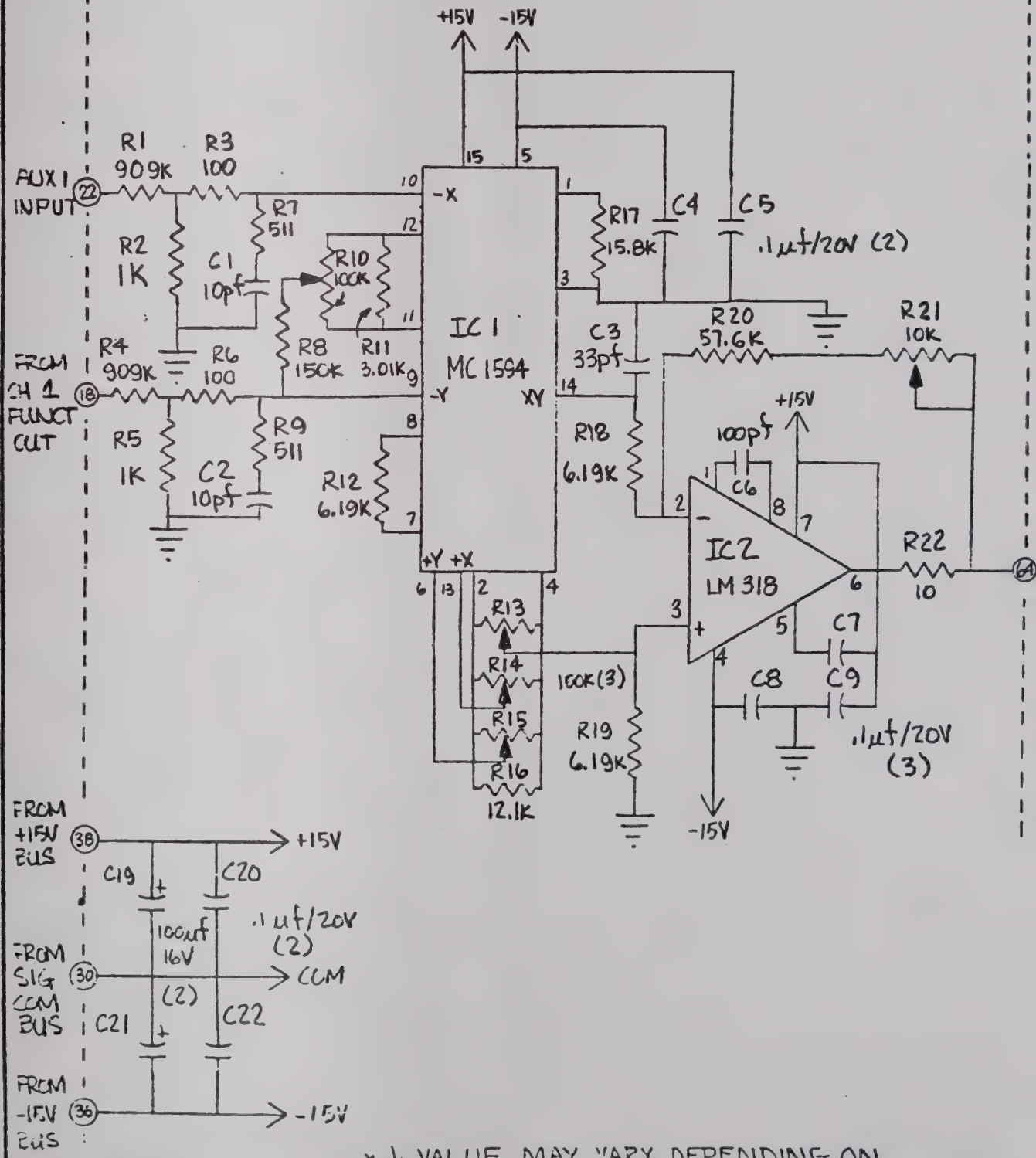
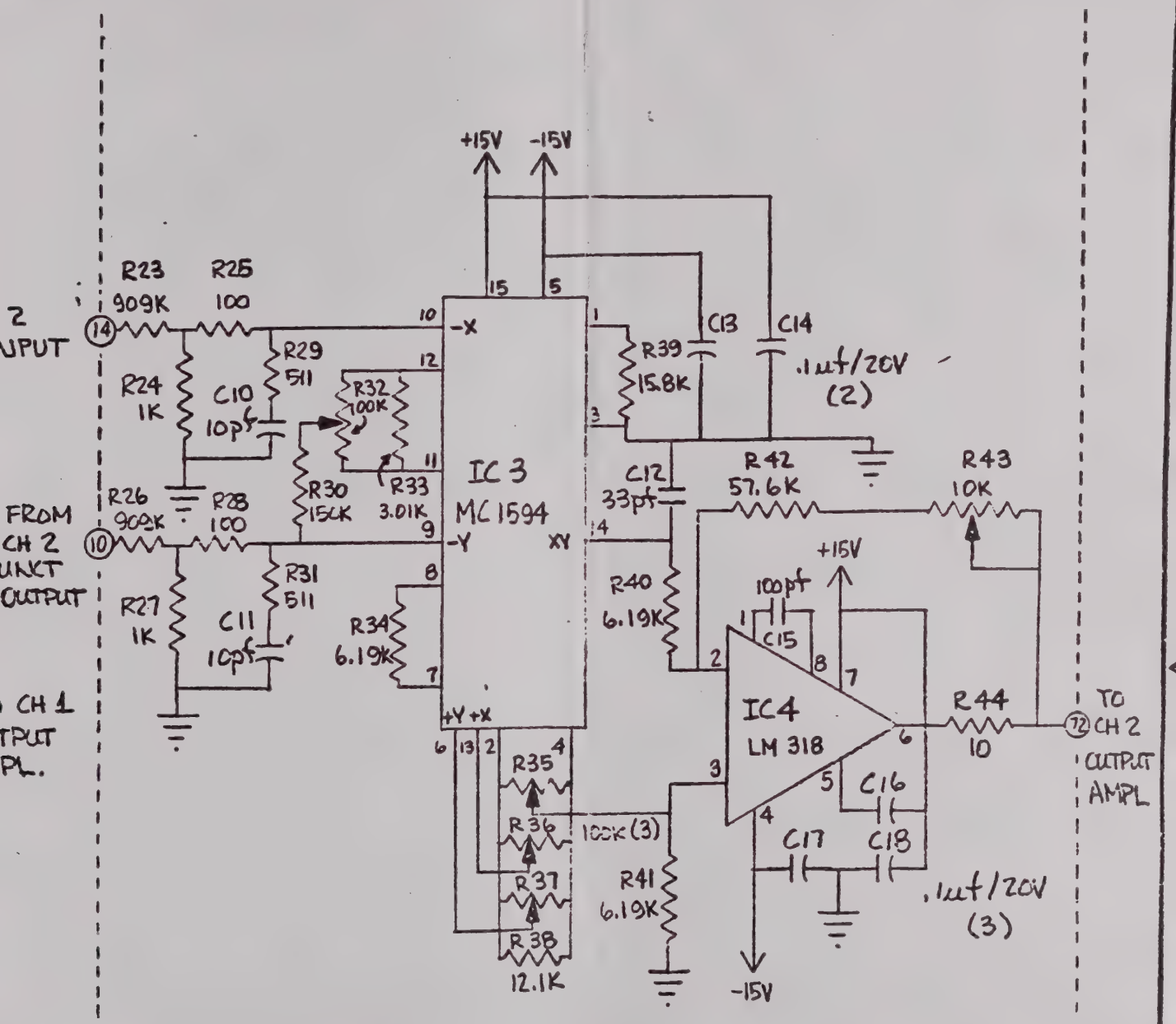


NOTE: UNLESS OTHERWISE SPECIFIED

* 1. VALUE MAY VARY DEPENDING ON INPUT / OUTPUT VOLTAGE RATIO REQUIRED

REV	ECN	BY	DATE	APP



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE 5/13/75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR T. O.		TITLE SCHEMATIC 152 X-Y OPTION BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 152-S-478.480	DWG NO. B152-247 REV
	SCALE	CODE	

FFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
ONE	CAP,CER,10PF,1KV	DD-100 LONG LEAD	CRL	1500-01-0001	4
ONE	CAP,CER,100PF,1KV	DD-101	CRL	1500-01-0111	2
ONE	CAP,CER,.1MF,20V	UK20-104LL	ARCO	1500-01-0403	12
ONE	CAP,CER,33PF,1KV	DD-330	CRL	1500-03-3011	2
ONE	CAP,ELECT,100MF,16V	500D107G016DC7	SPRAG	1500-31-0101	2
ONE	X-Y MULTIPLIER BD	152-147	WVTK	1700-00-0678	1
ONE	SKT,IC,16PIN	16-DIP	CINCH	2100-03-0022	2
ONE	PIN,MALE	61182-2	AMP	2100-05-0020	11
ONE	POT,TRIM,10K	91AR10K	BECK	4600-01-0315	2
ONE	POT,TRIM,100K	91AR100K	BECK	4600-01-0402	8
ONE	RES,MF,1/8W,1%,100	RN55D-1000F	TRW	4701-03-1000	4
ONE	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	4
ONE	RES,MF,1/8W,1%,10	RN55D-10R0F	TRW	4701-03-1009	2
ONE	RES,MF,1/8W,1%,12.1K	RN55D-1212F	TRW	4701-03-1212	2
ONE	RES,MF,1/8W,1%,150K	RN55D-1503F	TRW	4701-03-1503	2
ONE	RES,MF,1/8W,1%,15.8K	RN55D-1582F	TRW	4701-03-15R2	2
ONE	RES,MF,1/8W,1%,3.01K	RN55D-3011F	TRW	4701-03-3011	2
ONE	RES,MF,1/8W,1%,511	RN55D-5110F	TRW	4701-03-5110	4

WAVETEK PARTS LIST

TITLE
PCA,X-Y MULTIPLIER

ASSEMBLY NO.
1100-00-0678

REV
A

.FERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
)NE	RES,MF,1/8W,1%,57.6K	RN55D-5762F	TRW	4701-03-5762	2
)NE	RES,MF,1/8W,1%,6.19K	RN55D-6191F	TRW	4701-03-6191	6
)NE	RES,MF,1/8W,1%,9.09K	RN55D-9091F	TRW	4701-03-9091	4
)NE	IC	LM318H	NSC	7000-03-1800	2
)NE	IC	MC1594	MOT	7000-15-9400	2

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REV	ECN	BY	DATE	APP
B	2658	fra	10/9/82	

SINE CONVERTOR

IV SINE TP

+15V

-15V

GND

DISTORTION ADJ

L OUT

+15V

SIG COM

-15V

+5V

DGTL COM

R1 100

R2 100

C51 100 @16V

C52 .01@50V

C53 100 @16V

C54 .01@50V

C55 33 @10V

C56 .01@50V

R3 30.1K

R4 12.1K

R5 12.1K

R6 10K

R7 18.2K

R8 21.5K

R9 21.5K

R10 30.1K

R11 56.2K

R12 150K

R13 150K

R14 12.4K

R15 301K

R16 10K

R17 49.9K

R18 56.2K

R19 200

ESA 2508M

IC1

IC2 LF356

R20 100K

R21 274

R22 100K

IV SINE BAL.

R23 100

IV SINE GAIN

C3 .01

HIGH PASS FILTER

R24 4.99K

R25 100

R26 499

R27 4.99K

R28 4.99K

IC3 LM318

C50 .01

R29 500

COS. AMPLITUDE

R31 4.75K

R30 500

SIN. AMPLITUDE

R32 4.75K

C4 .01

R33 2.49K

C7 .01

OUTPUT BUFFERS

C5 68 pF

R34 4.99K

R105 178K

R106 100K

IC8 LM318

R35 100

C6 100pF

R36 4.99K *

C10 5pF

R107 178K

R37* 4.99K

R108 100K

IC9 LM318

R38 100

C9 100pF

C8 .01

R39 2.49K

C14 68 pF

R109 178K

R40 499K

R110 100K

IC6 LM318

R41 100

C13 100pF

R42 2.49K

C12 .01

C11 .01

C15 .01

R43 4.99K *

R111 178K

R45 499K

R112 100K

IC7 LM318

R46 100

C18 100pF

R44 2.49K

C16 .01

C17 5pF

C19 .01

R47 1K -COS 9/10

R48 1K +COS 7/8

R49 1K +SINE 5/6

R50 1K -SINE 1/2

SIG. COM.

R51 100

R52 100K

R53 10M

COS. BAL.

C20 100pF

IC5 LM318

C21 .01

C23 33 pF

R54 15K

C22 .01

R55 20K

IC12 LF356

R56 221

R57 221

C24 .01

C25 .01

R58 1K

C26 .01

R64 20K

IC13 LF356

C27 .01

R59 10K

R61 100

R60 100K

R62 10MEG

SIN. BAL.

C28 100 pF

IC4 LM318

C29 .01

C31 33 pF

R63 15K

C30 .01

R114 20K

IC11 LF356

R65 221

C32 .01

C33 .01

R66 221

R67 1K

C34 .01

R113 20K

IC10 LF356

C35 .01

R68 10K

CS6

C36 5 C37 5 C38 1 C39 0.1 C40 .01 C41 15-60pf C42 47 pf

K1 K2 K3 K4 K5

S.M. 1%

R69 R70 R71 R72 R73 7.87K (6 PLCS) R74

K6 K7 K8 K9

R75 R76 R77 R78 R79 7.87K (6 PLCS) R80

K10 K11 K12 K13

R81 R82 R83 R84 R85 7.87K (6 PLCS) R86

K14 K15 K16 K17

CS7

C43 5 C44 5 C45 1 C46 0.1 C47 .01 C48 15-60pf C49 910 pf C22

K18 K19 K20 K21

R87 R88 R89 R90 R91 7.87K (6 PLCS) R92

K23 K24 K25 K26

R93 R94 R95 R96 R97 7.87K (6 PLCS) R98

K27 K28 K29 K30

R99 R100 R101 R102 R103 7.87K (6 PLCS) R104

K31 K32 K33 K34

+5V

C2 1 2 3 4 5

R0 (T) R1 (T0) R2 (69) R3 (68) R4 (67)

XBOF3 (15) XBOF2 (14) XBOF1 (13) XBOF0 (12)

XBIF3 (19) XBIF2 (18) XBIF1 (17) XBIF0 (16)

XB2F3 (23) XB2F2 (22) XB2F1 (21) XB2F0 (20)

LOW PASS FILTER

R0 (T1) R1 (T0) R2 (69) R3 (68) R4 (67)

XBOF3 (15) XBOF2 (14) XBOF1 (13) XBOF0 (12)

XBIF3 (19) XBIF2 (18) XBIF1 (17) XBIF0 (16)

XB2F3 (23) XB2F2 (22) XB2F1 (21) XB2F0 (20)

BAND PASS FILTER

D152-232

1. ALL DIODES ARE FD666
2. ALL CAPACITOR VALUES ARE IN MICROFARADS (μfd)
3. ALL RESISTOR VALUES ARE IN OHMS (Ω)
4. *, * RESISTORS R36, R37 & R43, R45 MATCHED TO 1.1%

NOTE: UNLESS OTHERWISE SPECIFIED

LAST REF DESIG USED:

CAP	C57
DIODE	CR17
RES	R114
INT CIR	IC13

	3527	fra	11/3/83
C	3378	fra	10/10/82

REMOVE ALL BURRS AND BREAK SHARP EDGES

DRAWN DMBOWEN DATE 9-9-74

MATERIAL

PROJENGR

RELEASE APPROV

FINISH WAVETEK PROCESS

TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030

DO NOT SCALE DWG

SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: SCHEMATIC DIAGRAM FILTER BD

MODEL NO 152

DWG NO D152-232

REV C

CODE IDENT 23338

SHEET 1 OF 1

BRUNING 40-520 15821

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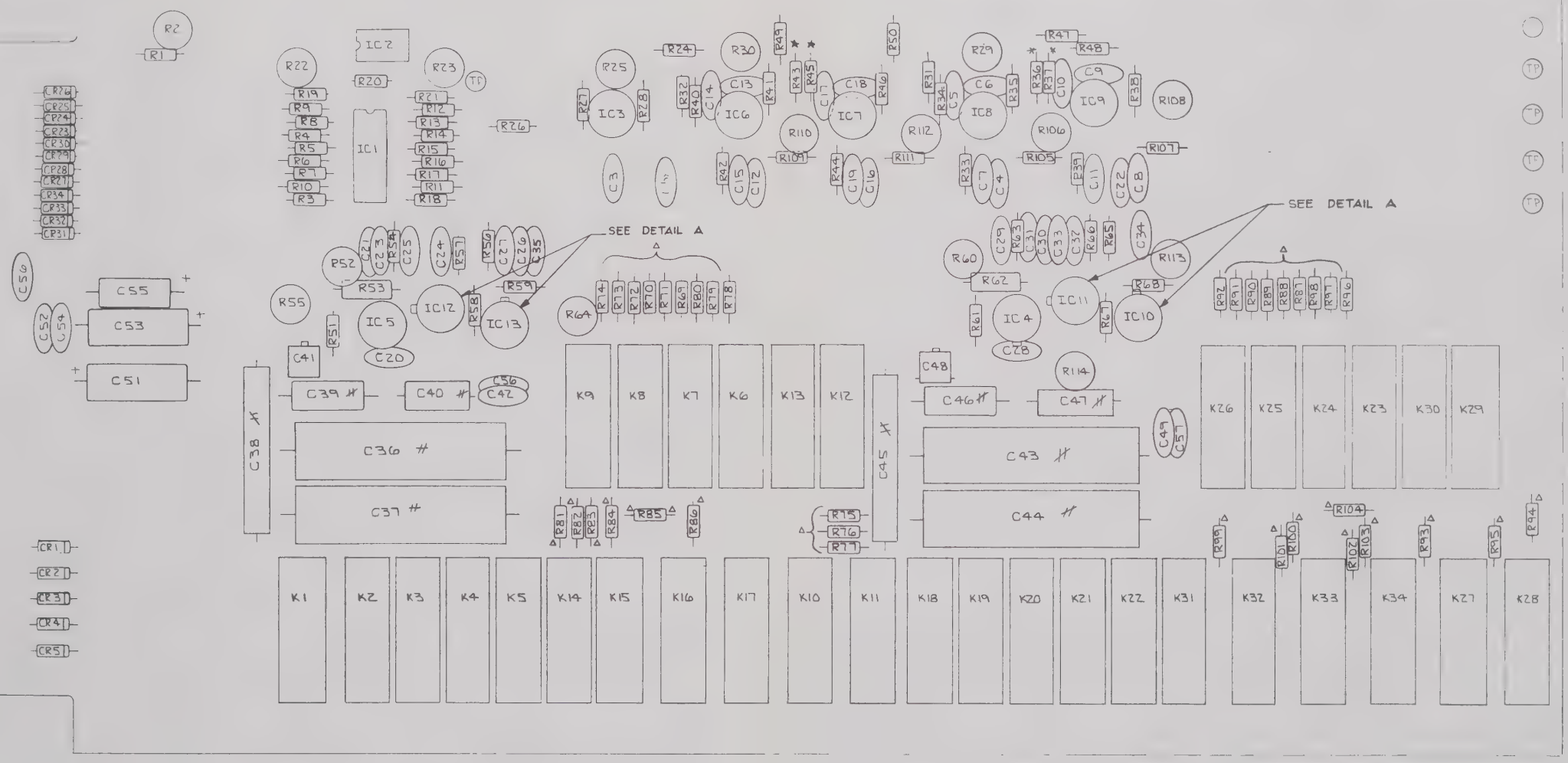
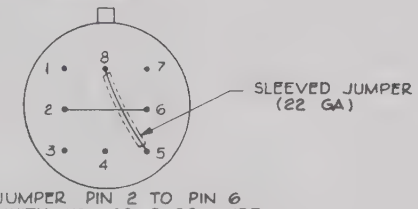
REV	I.N	BY	DATE	APP
B	3258	JL	10-5-82	
C	3378	JRA	10/4/83	
D	3527	JRA	11/1/83	



DETAIL A



JUMPER PIN 2 TO PIN 6
WITH NO. 22 BUSS WIRE
(ALL JUMPERS ON CIRCUIT SIDE)

4 [illegible]
3 # MATCHED SET ±0.1% OF PRINTED VALUE
2 ★ MATCHED SET ±0.1%
1. ★ MATCHED SET ±0.1%

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 2-13-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY FILTER BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ·010 ANGLES ·1 XX ·030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO D152-032 REV D
	SCALE 2/1	CODE IDENT 23338	SHEET 1 OF

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REV	SCN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP, CER, 5PF, 1KV	DD-050	CRL	1500-00-5011	2
NONE	CAP, CER, 100PF, 1KV	DD-101	CRL	1500-01-0111	6
NONE	CAP, CER, MN .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	25
NONE	CAP, CER, 33PF 1KV	DD-330 LONG LEAD	CRL	1500-03-3001	3
C14 C5	CAP, CER, 68PF, 1KV	DD-680	CRL	1500-06-8001	2
NONE	CAP, MICA, 47PF, 500V	DM15-470J	ARCO	1500-14-7000	2
NONE	CAP, 910PF, 100V, 1%	DM15-911F	ARCO	1500-19-1101	2
NONE	CAP, ELECT, 100MF, 16V	500D107G016DC7	SPRAG	1500-31-0101	2
NONE	VARI, 15-60PF, 200V	538-006-112F	ERIE	1500-56-0000	2
	CAP SET, POLYC MIXED MATCHED SET	130-501-6	WVTK	1509-80-0005	2
NONE	CAP, POLYC, .01MF, 100V PART OF 1509-80-0005 QTY(1)				
NONE	CAP, POLYC, .1MF, 100V PART OF 1509-80-0005 QTY(1)				
NONE	CAP, POLYC, 1MF, 100V PART OF 1509-80-0005 QTY(1)				

WAVETEK PARTS LIST | TITLE PCA, FILTER | ASSEMBLY NO. 1100-00-0146 PAGE 1 | REV C

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES, MF, 1/8W, 1%, 150K	RN55D-1503F	TRW	4701-03-1503	2
NONE	RES, MF, 1/8W, 1%, 178K	RN55D-1783F	TRW	4701-03-1783	4
NONE	RES, MF, 1/8W, 1%, 18.2K	RN55D-1822F	TRW	4701-03-1822	1
NONE	RES, MF, 1/8W, 1%, 200	RN55D-2000F	TRW	4701-03-2000	1
NONE	RES, MF, 1/8W, 1%, 21.5K	RN55D-2152F	TRW	4701-03-2152	2
NONE	RES, MF, 1/8W, 1%, 221	RN55D-2210F	TRW	4701-03-2210	4
NONE	RES, MF, 1/8W, 1%, 2.49K	RN55D-2491F	TRW	4701-03-2491	4
NONE	RES, MF, 1/8W, 1%, 274	RN55D-2740F	TRW	4701-03-2740	1
NONE	RES, MF, 1/8W, 1%, 30.1K	RN55D-3012F	TRW	4701-03-3012	2
NONE	RES, MF, 1/8W, 1%, 301K	RN55D-3013F	TRW	4701-03-3013	1
NONE	RES, MF, 1/8W, 1%, 4.75K	RN55D-4751F	TRW	4701-03-4751	2
NONE	RES, MF, 1/8, 1%, 499	RN55D-4990F	TRW	4701-03-4990	1
NONE	RES, MF, 1/8W, 1%, 4.99K	RN55D-4991F	TRW	4701-03-4991	5
NONE	RES, MF, 1/8W, 1%, 49.9K	RN55D-4992F	TRW	4701-03-4992	1
NONE	RES, MF, 1/8W, 1%, 56.2K	RN55D-5622F	TRW	4701-03-5622	2
NONE	RES, SET, 4-4.99K, 1/8W QTY 4 4701-03-4991	180-500-100A	WVTK	4789-00-0039	1
NONE	RES, SET, 36-7.87K	4789-00-0045	WVTK	4789-00-0045	1

WAVETEK PARTS LIST | TITLE PCA, FILTER | ASSEMBLY NO. 1100-00-0146 PAGE: 3 | REV C

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	CAP SET, POLYC MIXED MATCHED SET			1509-80-0005	
NONE	CAP, POLYC, 5MF, 100V PART OF 1509-80-0005 QTY(2)				
NONE	FILTER BOARD	152-132-REPEAT	WVTK	1700-00-0146	1
NONE	ADAPTER PLUG 16 PIN	616-BG1	AUGAT	2100-02-0062	1
NONE	RELAY, REED, FORM-A	RA3019-1051	ETROL	4500-00-0007	34
NONE	POT, TRIM, 10Ω	91AR10Ω	BECK	4600-01-0103	3
NONE	POT, TRIM, 100K	91AR100K	BECK	4600-01-0402	7
R113 R114 R55 R64	POT, TRIM, 20K	91AR20K	BECK	4600-02-0301	4
NONE	POT, TRIM, 500	91AR500	BECK	4600-05-0104	2
NONE	RES, C, 1/2W, 5%, 2.7M	RC20GF275	STKPL	4700-25-2704	2
NONE	RES, MF, 1/8W, 1%, 100	RN55D-1000F	TRW	4701-03-1000	7
NONE	RES, MF, 1/8W, 1%, 1K	RN55D-1001F	TRW	4701-03-1001	6
NONE	RES, MF, 1/8W 1%, 10K	RN55D-1002F	TRW	4701-03-1002	4
NONE	RES, MF, 1/8W, 1%, 100K	RN55D-1003F	TRW	4701-03-1003	1
NONE	RES, MF, 1/8W, 1%, 12.1K	RN55D-1212F	TRW	4701-03-1212	3
NONE	RES, MF, 1/8W, 1%, 15K	RN55D-1502F	TRW	4701-03-1502	2

WAVETEK PARTS LIST | TITLE PCA, FILTER | ASSEMBLY NO. 1100-00-0146 PAGE 2 | REV C

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	QTY 36 4701-03-7871				
NONE	DIODE	1N4148	FAIR	4807-02-6666	17
NONE	IC	LM318H	AMD	7000-03-1800	7
NONE	IC, OP-AMP	LF356N	NSC	7000-03-5600	1
IC10 IC11 IC12 IC13	IC, OP-AMP	LF356HC	NSC	7000-03-5601	4
NONE	IC	CA-3019	FAIR	7000-30-1900	4

WAVETEK PARTS LIST | TITLE PCA, FILTER | ASSEMBLY NO. 1100-00-0146 PAGE 4 | REV C

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES | MATERIAL | FINISH WAVETEK PROCESS | DRAWN | DATE | PROJ ENGR | RELEASE APPROV | TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030 | DO NOT SCALE DWG | SCALE

WAVETEK SAN DIEGO • CALIFORNIA

TITLE: PARTS LIST FILTER

MODEL NO 152 | DWG NO 1100-00-0146 | REV C | CODE IDENT 23338 | SHEET OF

BISHOP GRAPHICS/ACCUPRESS REORDER NO A 2804

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REV		BY	DATE	APP

GAIN ADJ R2 1K

+15 R3 100

LM318

BALANCE ADJ -15 -15

+SINE (5/6)

IC1 HA2405-5 XQP0 XQP1

IC10 IH5010

IC3 LF356

IC4 LM301A

IC12 IH5010

IC13 IH5010

IC5 LM301A

IC14 IH5010

IC2 HA2405-5

-COS (9/10)

+COS (7/8)

IC1 IH5010 (2)

IC6 LF356

IC7 LM301A

IC15 IH5010

IC8 LM301A

IC16 IH5010

IC17 IH5010

78.7K (6)

33.2 Ω (3)

LAST REF DES USED

RES	R128
CAP	C79
IC'S	IC44

NOT USED

R1-	R64	R97
R44	R70	R98
R45	R71	R99
R91	R88	R100
R90	R90	R101
R51	R91	R 23
R96	R92	R 96
R95	R93	R 10
R94	R94	

XPO (72) XPI (71) XP2 (70) XP3 (69) (MSB)

IC35 74164 IC34 74164 IC33 74164 IC32 74164

XQ1 (67)

IC27 1/2 74 (2) IC38 74

XQP0 (D0) XQP0 XQP1 (D1) XQP1

IC39 IC40 IC41 IC42 IC43 IC44 74175 74174

+15V (37/38) C76 100@16V C78 C79 C27 100@16V

TP2 SIG COM (29/30)

-.5 (35/36)

+5 (31/32) C30 C31 C32 C33 C34 C35 C36 C37 33@10V

DIG COM (27/28)

2. ALL CAPACITOR VALUES ARE IN MICROFARADS # ARE .01 @ 50V EXCEPT WHERE SHOWN

1. ALL RESISTOR VALUES ARE IN OHMS (Ω)

NOTE UNLESS OTHERWISE SPECIFIED

D	3437	SC	12-8-82
C	3435	[illegible]	1/5/82
B	[illegible]	[illegible]	[illegible]

REMOVE ALL BURRS AND BREAK SHARP EDGES | DRAWN D.M Bonk | DATE 9-27-77

MATERIAL | PROJ ENGR | RELEASE APPROV

FINISH WAVETEK PROCESS

TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES ±1 XX .030

DO NOT SCALE DWG | SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: SCHEMATIC DIAGRAM PHASE BD

MODEL NO	DWG NO	REV
152	DWS 2-226	D

CODE IDENT 23338 | SHEET 1 OF 2

152-226

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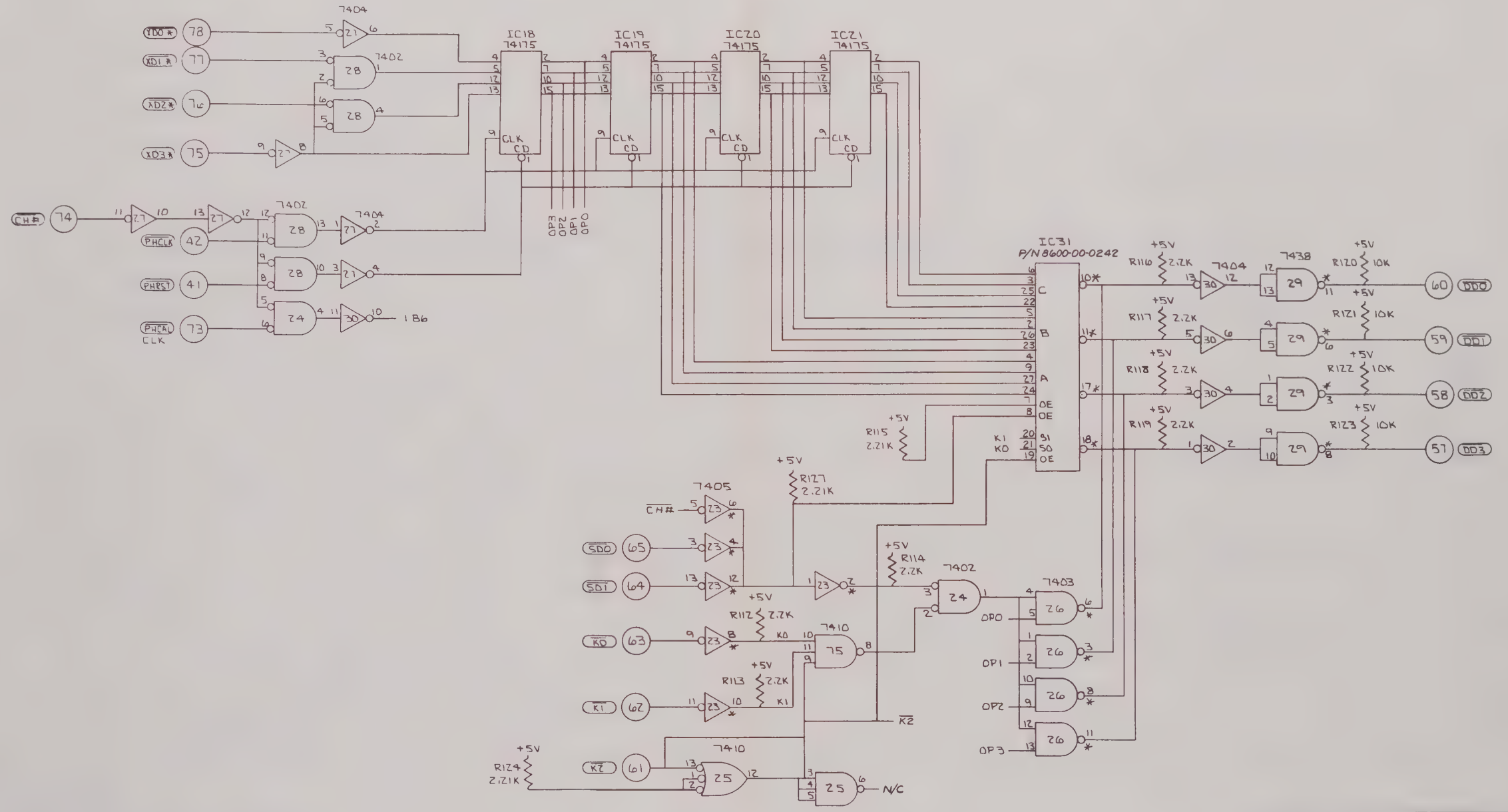
REV	ECN	BY	DATE	APP



NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 6-11-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: SCHEMATIC PHASE BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO D152-226 / REV D
	SCALE		CODE IDENT 23338 / SHEET 2 OF 2

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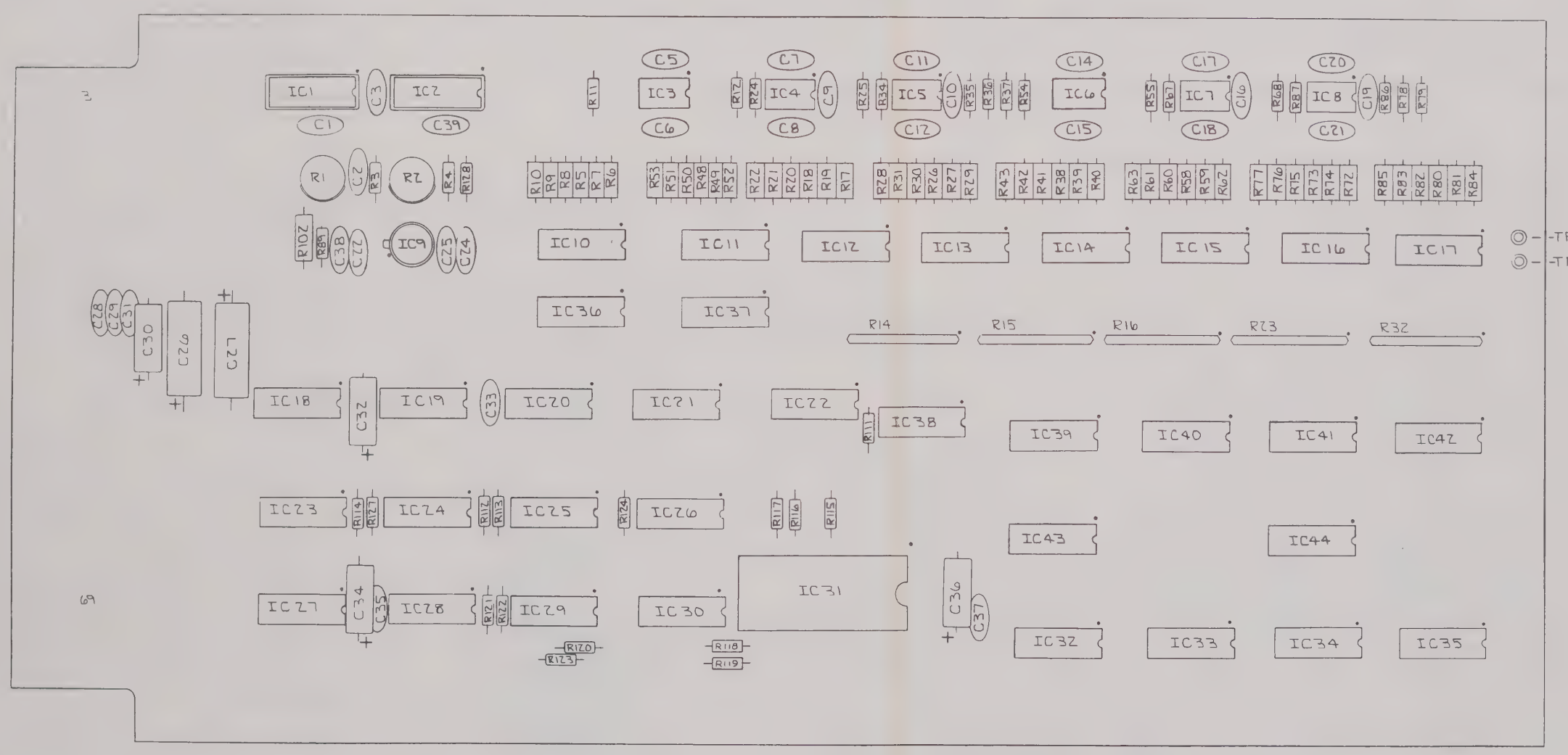
REV	ECN	BY	DATE	APP



NOTE UNLESS OTHERWISE SPECIFIED

D	3487	SE	12-8-82
C	3436	[illegible]	11-5-82
B	# 2033	[illegible]	4-20-79

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 6-20-75
MATERIAL	PROJ ENGR	
	RELEASE APPROV	
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030	
	DO NOT SCALE DWG	
	SCALE 2/1	

WAVETEK SAN DIEGO • CALIFORNIA

TITLE
ASSEMBLY
PHASE BOARD

MODEL NO	DWG NO	REV
152	D152-026	D

CODE IDENT 23338 SHEET 1 OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP, CER, 100PF, 1KV	DD-101	CRL	1500-01-0111	1
NONE	CAP, CER, MN, .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	23
NONE	CAP, CER, 15PF, 1KV	DD-150	CRL	1500-01-5011	3
NONE	CAP, CER, 33PF, 1KV	DD-330	CRL	1500-03-3011	4
NONE	CAP, ELECT, 100MF, 16V	500D107G016DC7	SPRAG	1500-31-0101	2
NONE	CAP, TANT, 33MF, 10V	150D336X9010B2	SPRAG	1500-73-3601	4
NONE	PHASE BOARD	152-126	WVTK	1700-00-0150	1
NONE	SKT, IC, 16PIN	16-DIP	CINCH	2100-03-0022	2
NONE	PIN, MALE	61182-2	AMP	2100-05-0020	4
NONE	POT, TRIM, 100K	91AR100K	BECK	4600-01-0402	1
NONE	POT, TRIM, 2K	91AR2K	BECK	4600-02-0201	1
NONE	RES, C, 1/2W, 5%, 10M	RC20GF-106	STKPL	4700-25-1005	1
NONE	RES, MF, 1/8W, 1%, 100	RN55D-1000F	TRW	4701-03-1000	5
NONE	RES, MF, 1/8W, 1%, 1K	RN55D-1001F	TRW	4701-03-1001	2
NONE	RES, MF, 1/8W, 1%, 10K	RN55D-1002F	TRW	4701-03-1002	6
NONE	RES, MF, 1/8W, 1%, 10	RN55D-10R0F	TRW	4701-03-1009	2
NONE	RES, MF, 1/8W, 1%, 15K	RN55D-1502F	TRW	4701-03-1502	1
NONE	RES, MF, 1/8W, 1%, 2.21K	RN55D-2211F	TRW	4701-03-2211	11

WAVETEK PARTS LIST | TITLE: PCA PHASE BOARD | ASSEMBLY NO. 1100-00-0150 | PAGE: 1 | REV B

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES, MF, 1/8W, 1%, 30.1K	RN55D-3012F	TRW	4701-03-3012	2
NONE	RES, MF, 1/8W, 1%, 33.2	RN55D-33R2F	TRW	4701-03-3329	6
NONE	RES, MF, 1/8W, 1%, 78.7K	RN55D-7872F	TRW	4701-03-7872	48
NONE	RES MODULE	4310R-101-103	BOURN	4770-00-0008	5
NONE	IC	LM 301AN	NSC	7000-03-0100	4
NONE	IC	LM318H	AMD	7000-03-1800	1
IC3 IC6	IC, OP-AMP	LF356N	NSC	7000-03-5600	2
NONE	IC	HA2405-5	HARIS	7000-24-0500	2
NONE	IC	5010	INTSL	7000-50-1000	10
NONE	IC	7402	TI	8000-74-0200	2
NONE	IC	7403	TI	8000-74-0300	1
NONE	IC	7404	TI	8000-74-0400	2
NONE	IC	7405	TI	8000-74-0500	1
NONE	IC	7410	TI	8000-74-1000	1
NONE	IC	7438	TI	8000-74-3800	1
NONE	IC	7474	TI	8000-74-7400	2
NONE	IC	74164	TI	8007-41-6400	4

WAVETEK PARTS LIST | TITLE: PCA PHASE BOARD | ASSEMBLY NO. 1100-00-0150 | PAGE 2 | REV B

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	74174	TI	8007-41-7400	4
NONE	IC	74175	TI	8007-41-7500	6
NONE	IC, PROGRAMMED REF 82S100 (WV2)	8600-00-0242	WVTK	8600-00-0242	1

WAVETEK PARTS LIST | TITLE: PCA PHASE BOARD | ASSEMBLY NO. 1100-00-0150 | PAGE: 3 | REV B

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST PHASE BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO 1100-00-0150 REV
	SCALE	CODE IDENT 23338	SHEET OF

BISHOP GRAPHICS/ACCUPRESS REORDER NO A-3861

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REV	DESCRIPTION	BY	DATE	APP
C	3488	SC	12-13-82	
B	#2065	[illegible]	3-20-81	
A	#0337	[illegible]	3-20-81	

LAST REF DESIG USED

CAP	C33
DIODE	CR2
RES	R92
INT CIR	IC40
TRAN	Q4

1. ALL CAPACITOR VALUES ARE IN MICROFARADS (μfd)
2. ALL RESISTOR VALUES ARE IN OHMS (Ω)

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN DMBOWEN DATE 9-77
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030
DO NOT SCALE DWG
SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: SCHEMATIC DIAGRAM OFFSET/FUNCTION BD

MODEL NO 152 | DWG NO D152-227 | REV C
CODE IDENT 23338 | SHEET 1 OF 1

152-227

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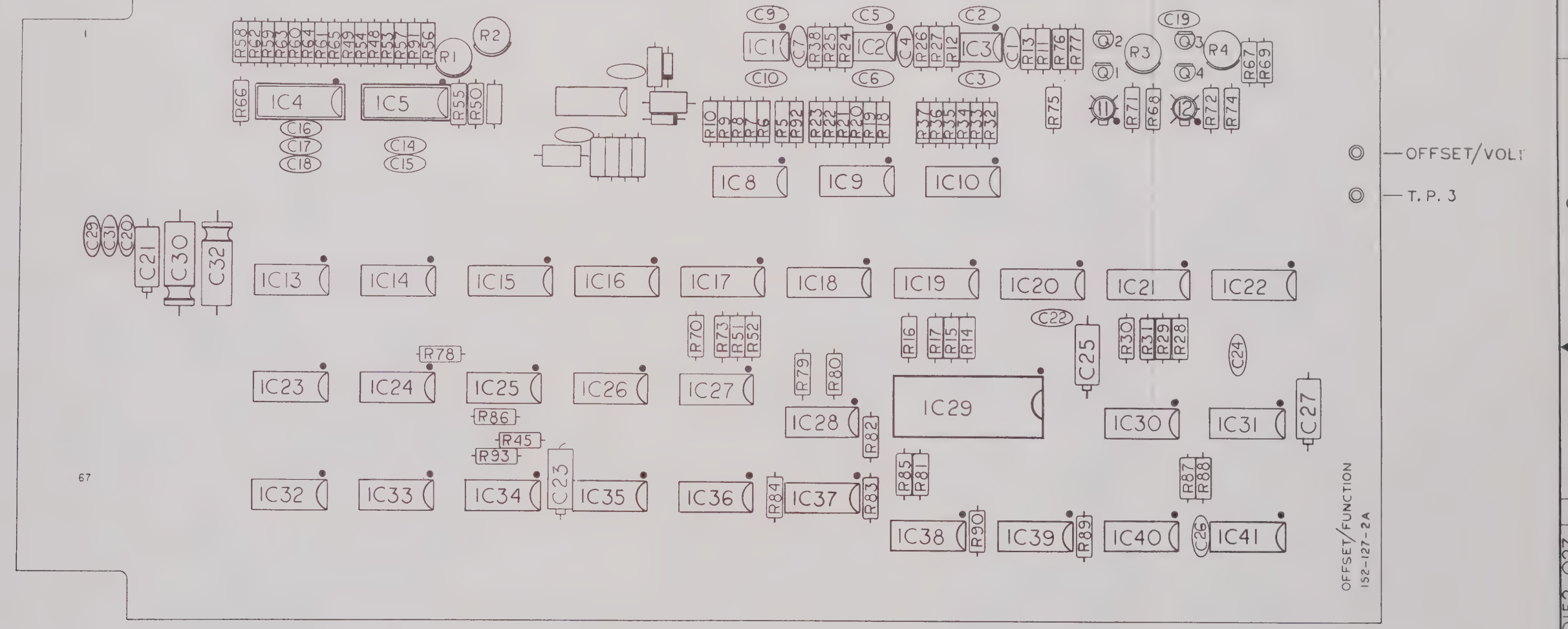
REV	ECN	BY	DATE	APP
A	3488	SC	2/3/82	



D152-027

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE 1-27-81
MATERIAL	PROGNCR	
	RELEASE APPROV	
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030	WAVETEK SAN DIEGO, CALIFORNIA
	DO NOT SCALE DWG	TITLE ASSEMBLY, OFFSET FUNCTION BD
	SCALE	MODEL NO / DWG NO D152-027 / REV A
	CODE IDENT 23338	SHEET OF

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP. CER. 5PF 1KV	DD-050	CRL	1500-00-5011	1
NONE	CAP. CER. MN. .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	17
NONE	CAP. CER. 33PF. 1KV	DD-330	CRL	1500-03-3011	3
NONE	CAP. CER. 47PF. 1KV	DD-470	CRL	1500-04-7011	2
NONE	CAP. ELECT. 100MF. 16V	500D107G016DC7	SPRAG	1500-31-0101	2
NONE	CAP. TANT. 33MF. 10V	150D336X9010B2	SPRAG	1500-73-3601	4
NONE	OFFSET/FUNCTION BD	152-127	WVTK	1700-00-0148	1
NONE	SKT. IC. 16PIN	16-DIP	CINCH	2100-03-0022	2
NONE	PIN. MALE	61182-2	AMP	2100-05-0020	10
NONE	POT. TRIM. 100	91AR100	BECK	4600-01-0103	2
NONE	POT. TRIM. 500	91AR500	BECK	4600-05-0104	2
NONE	RES. MF. 1/8W. 1%. 100	RN55D-1000F	TRW	4701-03-1000	3
NONE	RES. MF 1/8W. 1%. 1K	RN55D-1001F	TRW	4701-03-1001	6
NONE	RES. MF. 1/8W. 1%. 10K	RN55D-1002F	TRW	4701-03-1002	22
NONE	RES. MF. 1/8W. 1%. 12. 1K	RN55D-1212F	TRW	4701-03-1212	1
NONE	RES. MF. 1/8W. 1%. 13K	RN55D-1302F	TRW	4701-03-1302	2
NONE	RES. MF. 1/8W. 1%. 1.5K	RN55D-1501F	TRW	4701-03-1501	1
NONE	RES. MF. 1/8W. 1%. 15K	RN55D-1502F	TRW	4701-03-1502	4

WAVETEK PARTS LIST	TITLE PCA. OFFSET/FUNCTION	ASSEMBLY NO. 1100-00-0148 PAGE 1	REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES. MF. 1/8W. 1%. 1.78K	RN55D-1781F	TRW	4701-03-1781	2
NONE	RES. MF. 1/8W. 1% 1.96K	RN55D-1961F	TRW	4701-03-1961	6
NONE	RES. MF. 1/8W. 1% 2.21K	RN55D-2211F	TRW	4701-03-2211	10
NONE	RES. MF. 1/8W. 1%. 33.2	RN55D-33R2F	TRW	4701-03-3329	3
NONE	RES. MF. 1/8W. 1%. 7.87K	RN55D-7871F	TRW	4701-03-7871	6
NONE	RES. MF. 1/8W. 1%. 78.7K	RN55D-7872F	TRW	4701-03-7872	18
NONE	RES. MF. 1/8W. 1%. 9.09K	RN55D-9091F	TRW	4701-03-9091	1
NONE	RES. MF. 1/4W. 1%. 619K	RN60D-6193F	TRW	4701-13-6193	2
NONE	DIODE. ZENER. 10V	1N758A	FAIR	4801-01-0758	2
NONE	TRANS	2N3903	NSC	4901-03-9030	1
NONE	TRANS	2N3905	ITT	4901-03-9050	3
NONE	IC	LM 301AN	NSC	7000-03-0100	3
NONE	IC. DUAL DIFFERENTIAL COMPARATOR/SENSE AMP	NE521	SIG	7000-05-2100	1
NONE	IC	HA2405-5	HARIS	7000-24-0500	2
NONE	IC	CA-3080	RCA	7000-30-8000	2
NONE	IC	5010	INTSL	7000-50-1000	3
NONE	IC	7400	TI	8000-74-0000	1

WAVETEK PARTS LIST	TITLE PCA. OFFSET/FUNCTION	ASSEMBLY NO. 1100-00-0148 PAGE 2	REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	7402	TI	8000-74-0200	3
NONE	IC	7403	TI	8000-74-0300	3
NONE	IC	7404	TI	8000-74-0400	7
NONE	IC	7408	TI	8000-74-0800	1
NONE	IC	7410	TI	8000-74-1000	1
NONE	IC	7438	TI	8000-74-3800	1
NONE	IC	7486	TI	8000-74-8600	1
NONE	IC	74107	TI	8007-41-0700	2
NONE	IC	74175	TI	8007-41-7500	8
NONE	IC, PROGRAMMED REF 82S100 (WV2)	8600-00-0242	WVTK	8600-00-0242	1

WAVETEK PARTS LIST	TITLE PCA. OFFSET/FUNCTION	ASSEMBLY NO. 1100-00-0148 PAGE 3	REV A

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE PARTS LIST OFFSET/FUNCTION
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO 1100-00-0148 / REV A
	SCALE		CODE IDENT 23338 / SHEET OF

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REV	ECN	BY	DATE	APP

FUNCTION IN T.P.1

IC9 IH5010 — IC8 IH5010 — IC7 LF356H — IC6 IH5010 — IC4 IH5010

IC3 LM318 — IC2 HA2405-5 — IC1 AD509 — IC29 MC1496P

74174 — 74175 — 74LS175 — 7404 — 7402 — 7474 — 7430 — 7438

OFFSET ADJ R81 100

OFFSET VOLTAGE — +PAISV — CHANNEL OUTPUT — -PAISV

BALANCE ADJ

IC17 P/N 8600-00-0242

LAST REF DESIG USED:

CAP	C41
TRAN	Q1
RES	R98
INT CIR	IC28

2. ALL CAPACITOR VALUES ARE IN MICROFARADS (μfd)
1. ALL RESISTOR VALUES ARE IN OHMS (Ω)

NOTE UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP
D	3489	SC	12-8-82	
C	ECN 3434	[illegible]	11-15-82	
B	ECN 2658	[illegible]	1-26-82	
A	ECN # 2214	LJTE	6-24-80	

REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN DM BOWEN DATE 9-8-77
PROJENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX ± .030
DO NOT SCALE DWG
SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: SCHEMATIC DIAGRAM AMP/LOGIC BD

MODEL NO 152 — DWG NO 152-228 — REV D

CODE IDENT 23338 — SHEET 1 OF 1

152-228

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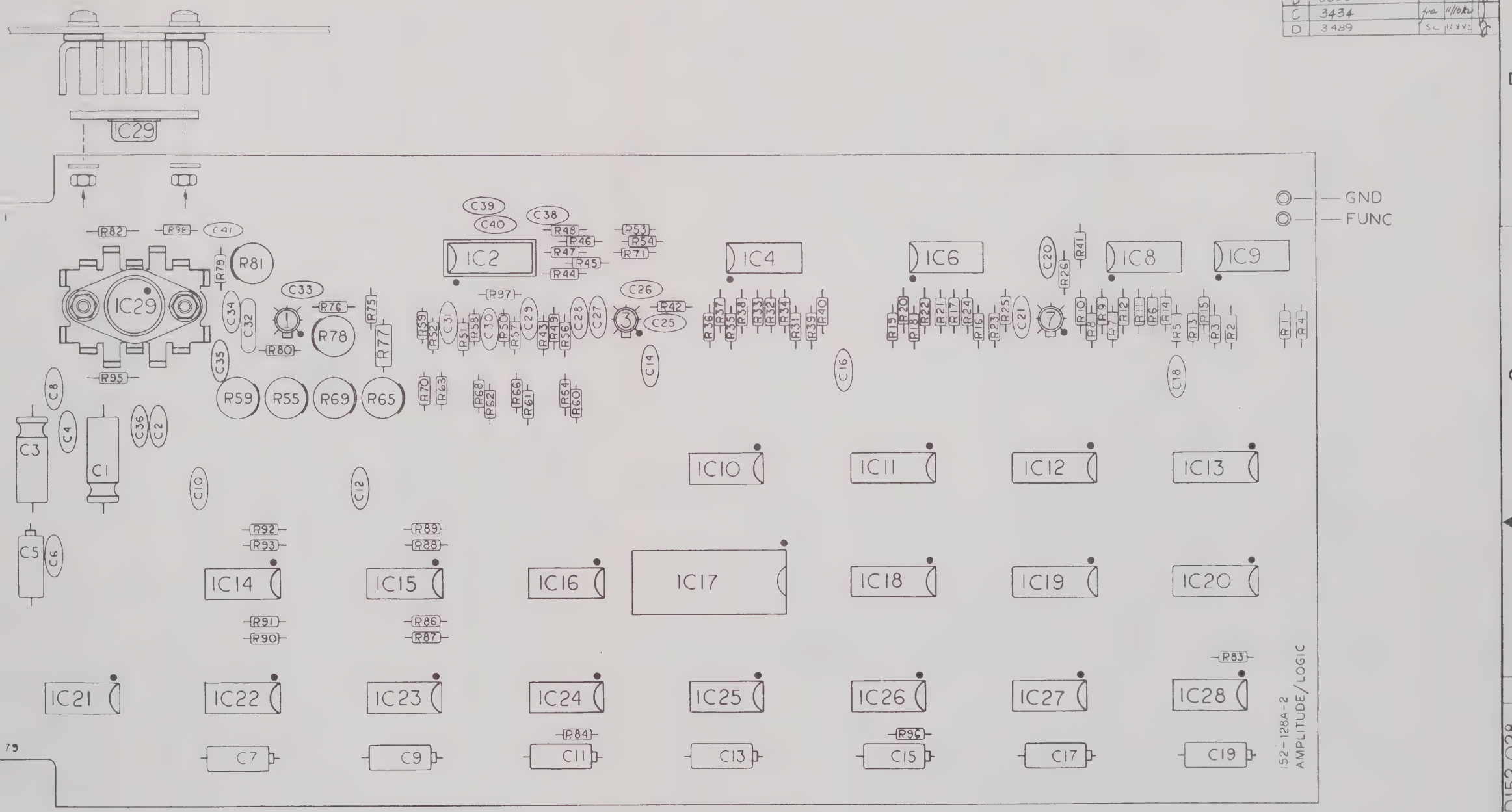
REV	ECN	BY	DATE	APP
A	ECN # 2214	LJTE	6-28-82	
B	2658	fra	1/20/83	
C	3434	fra	11/16/84	
D	3489	SC	12-8-85	



NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN Hug 1-22-75	WAVETEK
MATERIAL	ENGINEER	TITLE ASSEMBLY, AMPLITUDE/LOGIC
FINISH WAVETEK PROCESS	RELEASE APPROV.	
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.005 ANGLES ±1° .XX ±.01	
	DO NOT SCALE DWG.	MODEL NO.
	SCALE	SIZE D152-028 D
		23338

D152-028

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	HEATSINK, MOD FROM 2800-11-0010	152-326	WVTK	1400-00-8669	1
NONE	CAP, CER, MN, .01MF, 50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	19
NONE	CAP, CER, 15PF, 1KV	DD-150	CRL	1500-01-5011	1
NONE	CAP, CER, 22PF, 1KV	DD-220 LONG LEAD	CRL	1500-02-2001	1
NONE	CAP, CER, 68PF, 1KV	DD-680	CRL	1500-06-8001	4
C41	CAP, CER, 82PF, 1KV	DD-820	CRL	1500-08-2011	1
NONE	CAP, MICA, 150PF, 500V	DM15-151J	ARCO	1500-11-5100	1
NONE	CAP, ELECT, 100MF, 16V	500D107G016DC7	SPRAG	1500-31-0101	2
NONE	CAP, TANT, 33MF, 10V	150D336X9010B2	SPRAG	1500-73-3601	8
NONE	AMP/LOGIC BOARD	152-128	WVTK	1700-00-0147	1
NONE	SKT, IC, 16PIN	16-DIP	CINCH	2100-03-0022	1
NONE	PIN, MALE	61182-2	AMP	2100-05-0020	2
NONE	POT, TRIM, 100	91AR100	BECK	4600-01-0103	1
NONE	POT, TRIM, 100K	91AR100K	BECK	4600-01-0402	4
NONE	POT, TRIM, 20	91AR20	BECK	4600-02-0000	1
NONE	RES, MF, 1/8W, 1%, 100	RN55D-1000F	TRW	4701-03-1000	2
NONE	RES, MF, 1/8W, 1%, 1K	RN55D-1001F	TRW	4701-03-1001	5

WAVETEK PARTS LIST | TITLE PCA AMP/LOGIC | ASSEMBLY NO. 1100-00-0147 | PAGE: 1 | REV D

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES, MF, 1/8W, 1%, 10K	RN55D-1002F	TRW	4701-03-1002	21
NONE	RES, MF, 1/8W, 1%, 100K	RN55D-1003F	TRW	4701-03-1003	4
NONE	RES, MF, 1/8W, 1%, 1.1K	RN55D-1101F	TRW	4701-03-1101	1
NONE	RES, MF, 1/8W, 1%, 15	RN55D-15R0F	TRW	4701-03-1509	2
NONE	RES, MF, 1/8W, 1%, 16.5K	RN55D-1652F	TRW	4701-03-1652	1
NONE	RES, MF, 1/8W, 1%, 200	RN55D-2000F	TRW	4701-03-2000	5
NONE	RES, MF, 1/8W, 1%, 2K	RN55D-2001F	TRW	4701-03-2001	4
NONE	RES, MF, 1/8W, 1%, 2.21K	RN55D-2211F	TRW	4701-03-2211	11
NONE	RES, MF, 1/8W, 1%, 2.49K	RN55D-2491F	TRW	4701-03-2491	1
NONE	RES, MF, 1/8W, 1%, 30.1K	RN55D-3012F	TRW	4701-03-3012	6
NONE	RES, MF, 1/8W, 1%, 301K	RN55D-3013F	TRW	4701-03-3013	6
NONE	RES, MF, 1/8W, 1%, 464	RN55D-4640F	TRW	4701-03-4640	1
NONE	RES, MF, 1/8, 1%, 499	RN55D-4990F	TRW	4701-03-4990	1
NONE	RES, MF, 1/8W, 1%, 7.5K	RN55D-7501F	TRW	4701-03-7501	1
NONE	RES, MF, 1/8W, 1%, 78.7K	RN55D-7872F	TRW	4701-03-7872	6
NONE	RES, MF, 1/8W, 1%, 9.09K	RN55D-9091F	TRW	4701-03-9091	1
NONE	RES, MF, 1/4W, 1%, 196	RN60D-1960F	TRW	4701-13-1960	1

WAVETEK PARTS LIST | TITLE PCA AMP/LOGIC | ASSEMBLY NO. 1100-00-0147 | PAGE: 2 | REV D

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	LM318H	AMD	7000-03-1800	1
IC7	IC, OP-AMP	LF356HC	NSC	7000-03-5601	1
NONE	IC	AD509JH	ANDEV	7000-05-0900	1
NONE	IC	MC1438R	MOT	7000-14-3800	1
NONE	IC	HA2405-5	HARIS	7000-24-0500	1
NONE	IC	5010	INTSL	7000-50-1000	4
NONE	IC	7402	TI	8000-74-0200	2
NONE	IC	7404	TI	8000-74-0400	3
NONE	IC	7430	TI	8000-74-3000	1
NONE	IC	7438	TI	8000-74-3800	2
NONE	IC	7474	TI	8000-74-7400	2
NONE	IC	74175	TI	8007-41-7500	6
NONE	IC, PROGRAMMED REF 82S100 (WV2)	8600-00-0242	WVTK	8600-00-0242	1

WAVETEK PARTS LIST | TITLE PCA AMP/LOGIC | ASSEMBLY NO. 1100-00-0147 | PAGE: 3 | REV D

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST AMP/LOGIC
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		MODEL NO 152 / DWG NO 1100-00-0147 / REV D
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET OF
	SCALE		

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-2884

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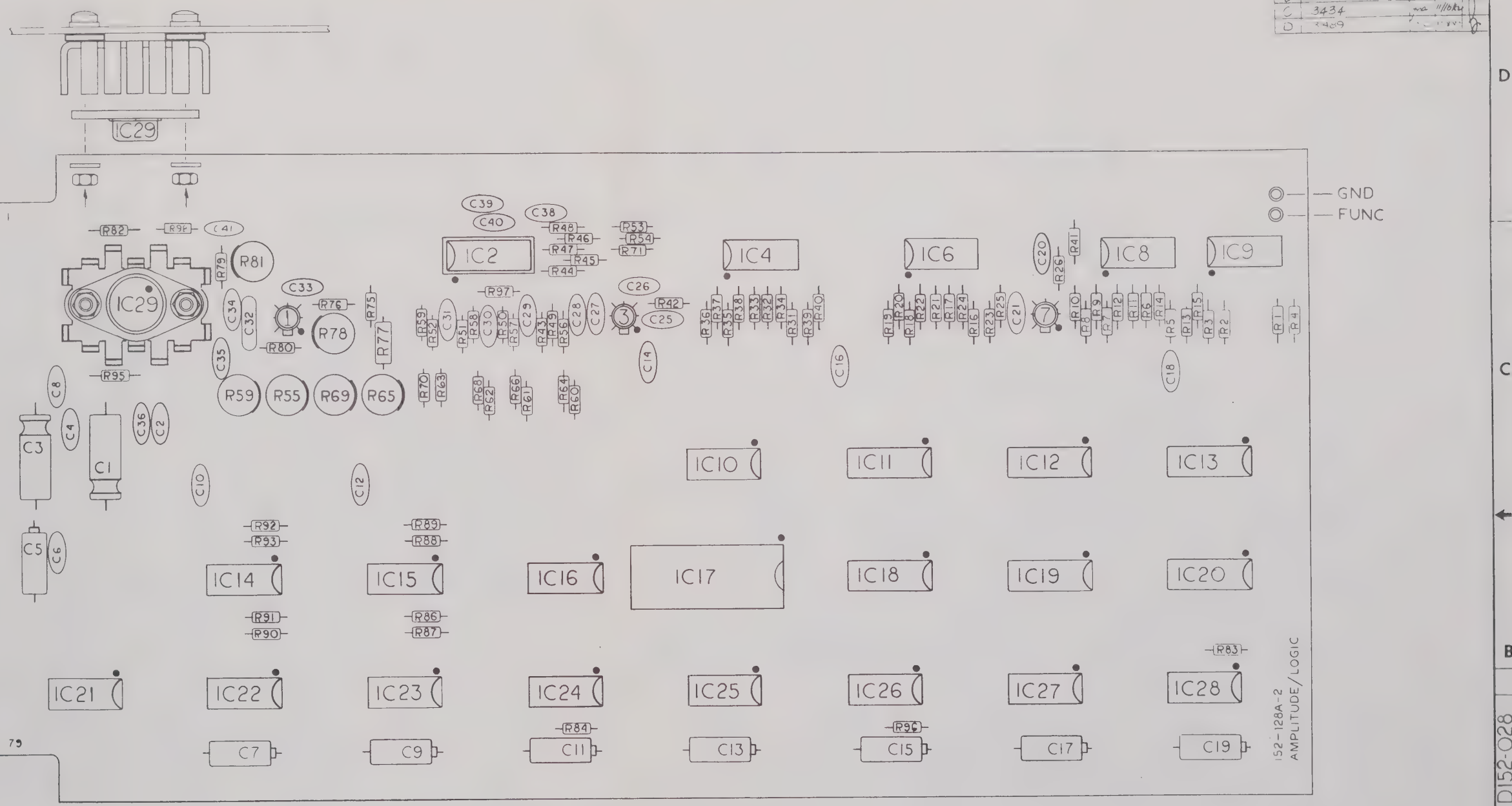
REV			DATE	APP
A	ECN # 2214			
B				
C	3434			
D	3469			



NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN Hug 1-24-75	WAVETEK	
MATERIAL	CHECKED	TITLE ASSEMBLY, AMPLITUDE/LOGIC	
	RELEASE APPROV.		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX .010 ANGLES 1 .XX .030		
	DO NOT SCALE DWG.	MODEL NO.	DWG. NO. D152-028 D
	SCALE	23338	

APPENDIX A

ADVANCED PROGRAMMING

The Model 152 will accept standard format statements such as:

WRITE (10,700) NU, A, F, O, M, NFUNC

700 FORMAT ("G", I1, "A", E12.2, "F", E12.2, "D", F6.2, "B", I1, "C", I1, "I")

Where	NU	is unit number
	A	is amplitude value
	F	is frequency value
	O	is offset value
	M	is mode number
	NFUNC	is function code

and literals in quotations are defined in figure 3-1.

For example, the Model 152 would first be sent an ASCII "G" followed by the integer value stored at "NU". The trailing ASCII "I" is the group execute of the generator.

Note that the amplitude or frequency values will be sent to the instrument exactly as they would to a printer; for example, the value 123:

A^^^^1.23^^02

That is, a field 12 characters wide with 2 characters to the right of the decimal point. However, some systems would output:

A^^^^.12E^^03

for the same E12.2 field, and some systems allow formats of the type: 1PE 12.2 which yield:

A^^^^1.23E^02

for the value 123.

If the 1P modifyer is not available, the value can be divided by 10 to decrease the exponent. If the value in variable "F" were 123,450 (Hz), for example, it could be formatted as:

("F", E12.3) or (1HF, E12.3)

The result would be a value of 0.12345E6/10 or .12345E5. This would be sent as:

F^^^^.123^05

The Model 152 would ignore the decimal and place it between the 1 and the 2 resulting in a frequency of 1.23 5 or 123,000 Hz.

Whatever the case, the output must be properly scaled by noting that the instrument retains the last three value digits and ignores previous digits and decimal points in the value field. Similarily, it accepts only the last exponent digit and ignores exponent signs. The exception is phase which retains the last four value digits, places a decimal between the third and fourth, and has no exponent.

Amplitudes are accepted as a three digit value X.XX along with a range digit. The most significant digit can range from 0 to 9 and the decimal is put between the first and second digits. A range digit is always accepted as a negative exponent (divider); a zero for no attenuation, a -1 for 1/10 and a -2 for 1/100 of the output. A computed range digit of +1 would be accepted as a -1, therefore do not attempt to send A0.123E+01.

Offset accepts a three digit value X.XX which ranges from 0.00 to ±9.99Vdc. Offset is not attenuated and does not accept a range digit.

Frequency is programmed with the same value fields as amplitude. The most significant digit can range from 1 to 9, the decimal is put between the first and second digits, and the exponent is accepted as a positive 0 through 4.

MODEL 152
VARIPHASE GENERATOR

WITH OPTION 001

Descriptive data for Option 001, input isolation, are contained in the rear of this manual.

WAVETEK®

9045 Balboa Ave., San Diego, Calif. 92123
P. O. Box 651, San Diego, California 92112
Tel 714/279 2200 TWX 910-335-2007

Model 152 Option -001

The -001 option provides isolated data input to the 'Wavetek ASCII bus'. An isolated Busy/Output is also provided. For a -001 option, the 'Aux' program connector is used.

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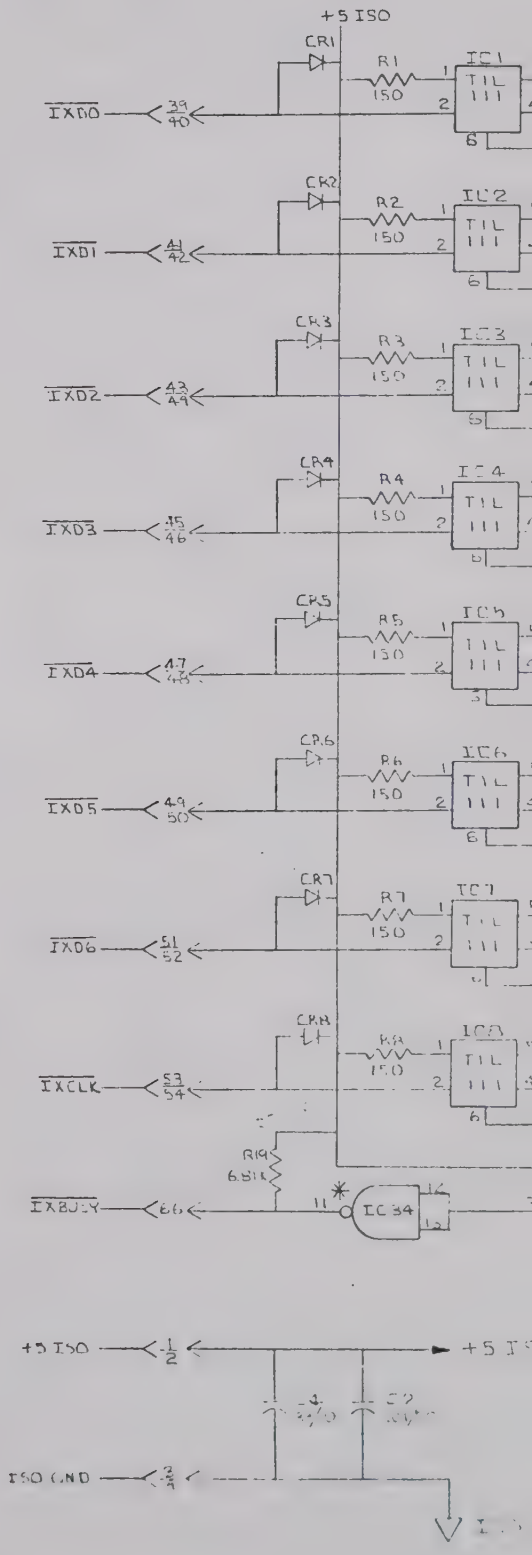
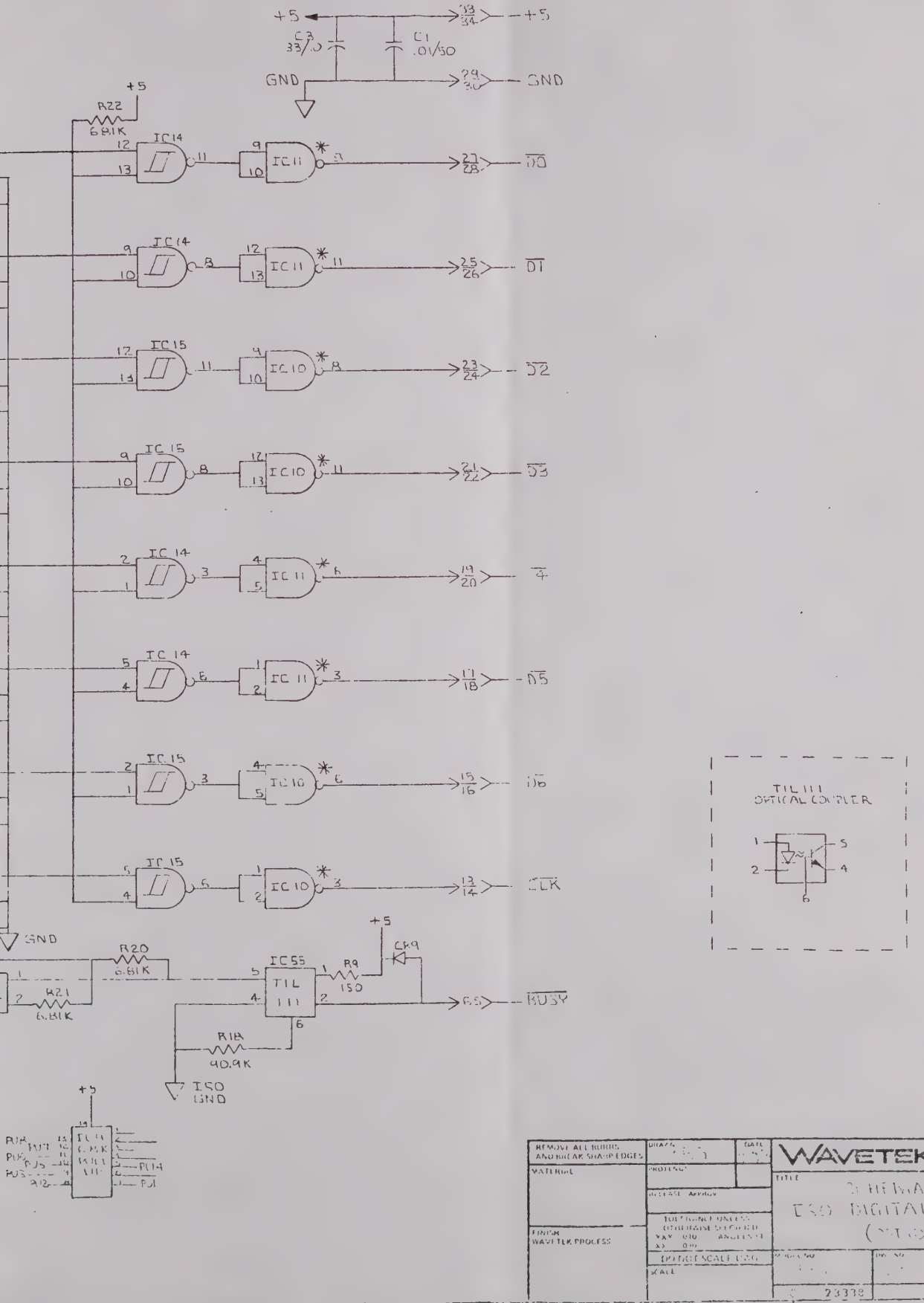


NOTE UNLESS OTHERWISE SPECIFIED

4	3	2	1

REV	ECN	BY	DATE	APP
A	REDRAWN			



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
WATERLINE	PROTECT		TITLE SCHEMATIC D30 DIGITAL INPUT (MUX)
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED XX ±.010 ANGLES ±1°		
	DO NOT SCALE DWG.		
	SCALE		23378

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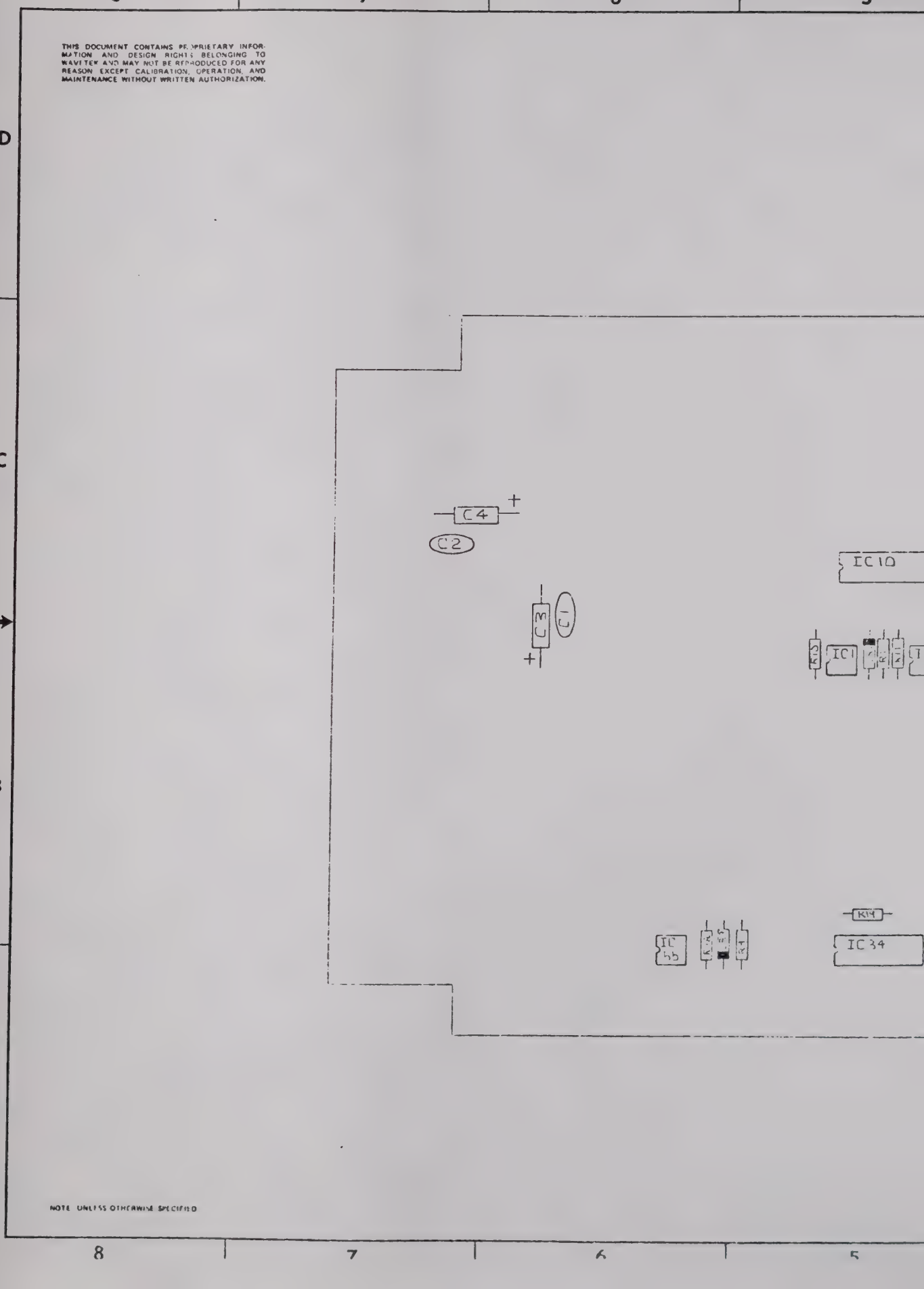
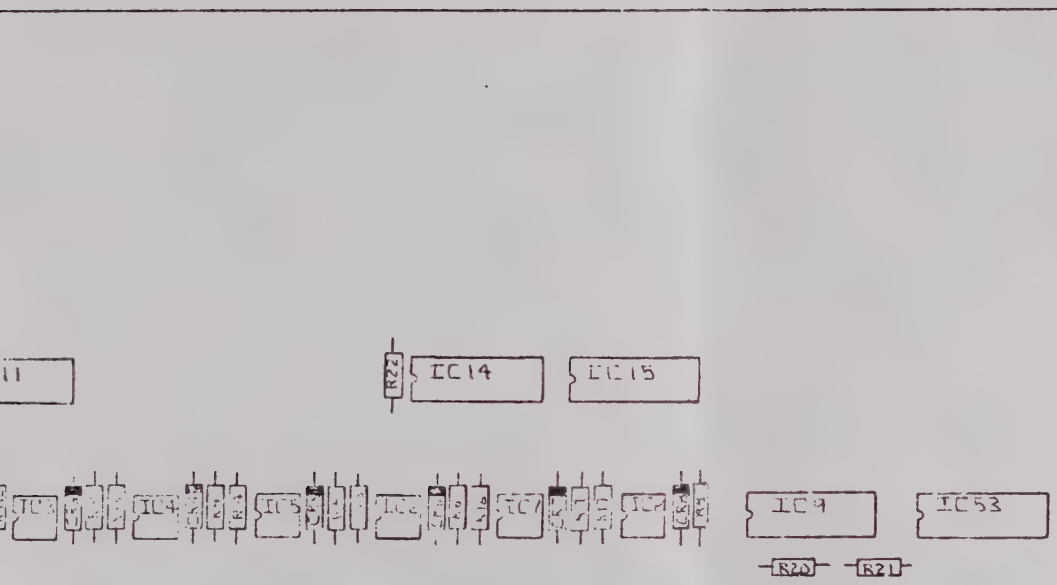


NOTE UNLESS OTHERWISE SPECIFIED

D C B A

8 7 6 5

REV	ECN	BY	DATE
A	REDRAWN	[illegible]	[illegible]



REMOVE ALL BURRS AND BREAK SHARP EDGES

MATERIAL

FINISH
WAVETEK PROCESS

DRAWN

DATE

PROTRACTOR

RELEASE APPROV

TOLERANCE UNLESS OTHERWISE SPECIFIED
XXX ± 010 ANGLES ± 1
XX ± 010

DO NOT SCALE DWG

SCALE 1/1

WAVETEK

TITLE
ASSEMBLY
[illegible]
(CUT-OUT)

DRAWING NO.
23338

SHEET

1 2 3 4

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP,CER,.01MF,50V	CK-103	CRL	1500-01-0310	2
NONE	CAP,TANT,33MF,10V	150D336X9010B2	SPRAG	1500-73-3601	2
NONE	IEC ISO OPTION 8D	152-135	WVTK	1700-00-0679	1
NONE	RES,MF,1/8W,1%,150	RN55D-1500F	TRW	4701-03-1500	9
NONE	RES,MF,1/8W,1%,6.81K	RN55D-6811F	TRW	4701-03-6811	4
NONE	RES,MF,1/8W,1%,90.9K	RN55D-9092F	TRW	4701-03-9092	9
NONE	RES MODULE	899-1-R6.8K	BECK	4770-00-0003	1
NONE	DIODE	FD-6666	FAIR	4807-02-6666	9
NONE	LED	TIL-111	TI	4899-00-0012	9
NONE	IC	7438	TI	8000-74-3800	3
NONE	IC	74132	TI	8007-41-3200	3

WAVETEK PARTS LIST	TITLE PCA,OPTION 001	ASSEMBLY NO. 1100-00-0681 PAGE: 1	REV

INSTRUCTION MANUAL

MODEL 581
HP21MX INTERFACE

THIS DOCUMENT CONTAINS INFORMATION PROPRIETARY TO WAVETEK. THE INFORMATION IN THIS DOCUMENT IS NOT TO BE USED OR DUPLICATED IN ANY MANNER WITHOUT THE PRIOR APPROVAL IN WRITING OF WAVETEK.

WAVETEK
Box 651, San Diego, Calif., 714-279-2200

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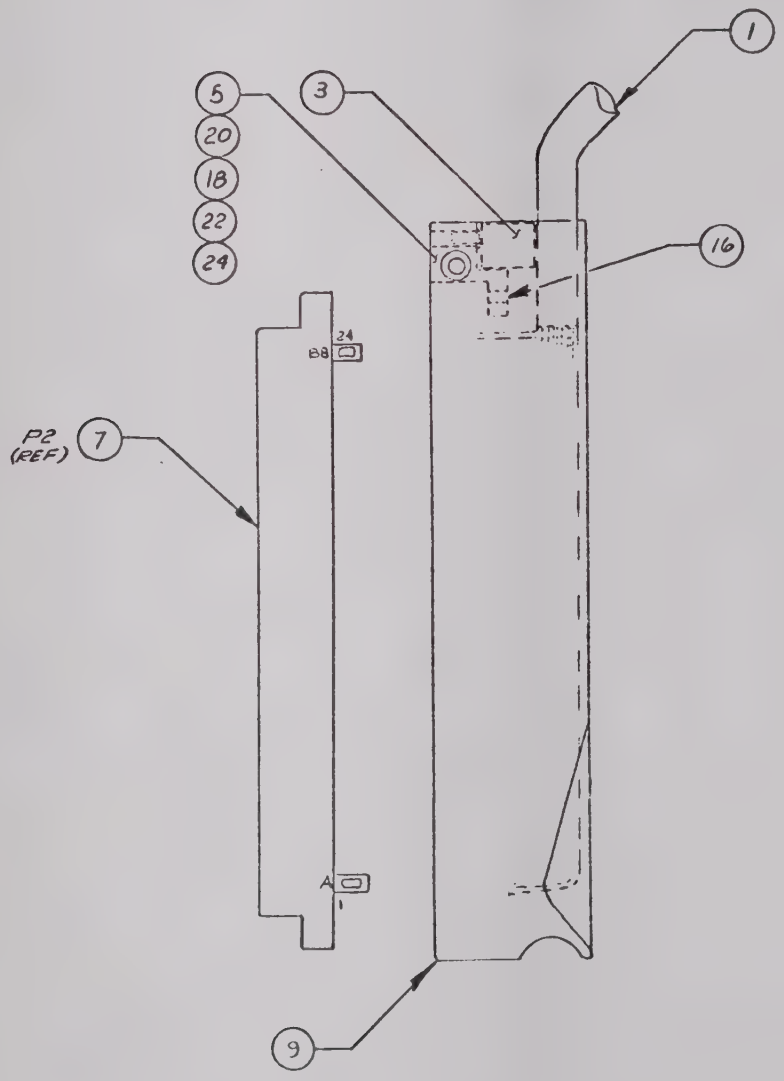
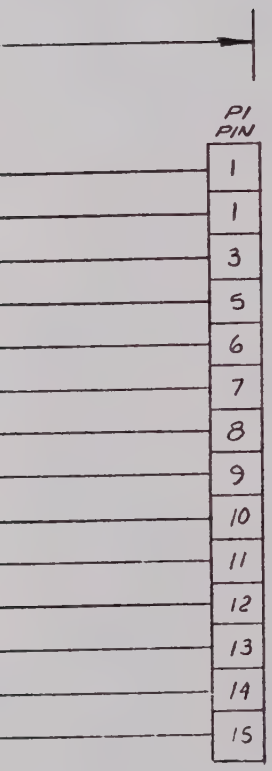
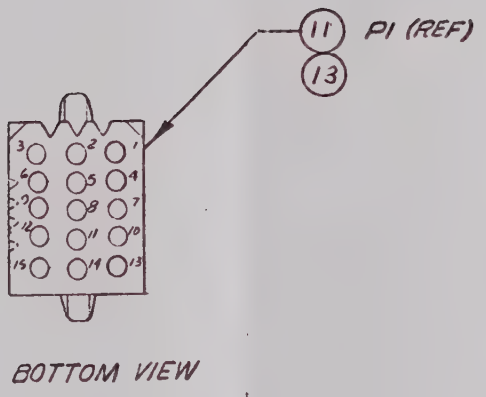


12 Ft. M
100 Ft. M

P2 PIN	
COM	1
COM	A
KBRD EM	24
SAFTEY GND	A
BUSY	E
KBRD RET	BB
XD2	13
XD4	12
XD3	P
XD1	14
XD5	M
XD0	N
XD6	C
XCLK	D

NOTE UNLESS OTHERWISE SPECIFIED





BOTTOM VIEW

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN RC	DATE 2-23-5	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	APPROVED	4/24/5	TITLE: CABLE ASSEMBLY HP2100 INTERFACE
FINISH WAVETEK PROCESS	RELEASED		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XX ±.010 ANGLES ±1		
	DO NOT SCALE DWG		MODEL NO 581
	SCALE 2-1		DWG NO 1203-00-0006 REV A
			U.S. 23338 SHEET 1 OF 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SCHEMATIC H/P INTER.	0103-00-0174	WVTK	0103-00-0174	1
11	PLUG,15PIN	03-09-2151	MOLEX	2100-02-0013	1
3	CLAMP,CABLE	5040-6003	HP	2100-02-0057	1
9	HOOD	5040-6071	HP	2100-02-0058	1
5	CONN,BLOCK	5040-6072	HP	2100-02-0059	1
7	CONN,EDGE,24PIN	1251-0335	HP	2100-03-0025	1
NONE	PIN,MALE	02-09-2118	MOLEX	2100-05-0005	13
NONE	CABLE	1181/15	ALPHA	6001-72-2000	50

WAVETEK PARTS LIST	TITLE CABLE ASSY	ASSEMBLY NO. 1203-00-0006 PAGE: 1	REV A

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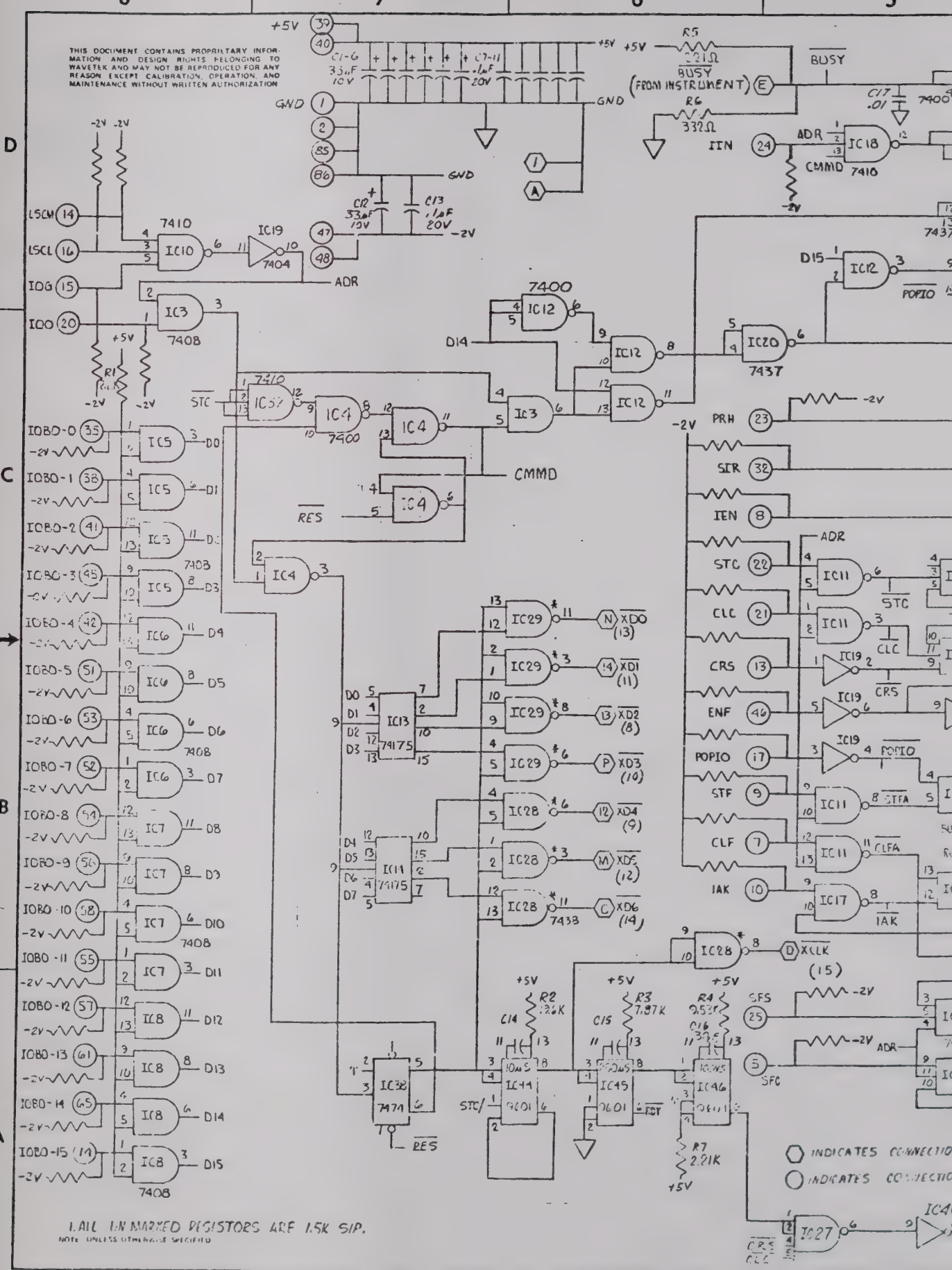
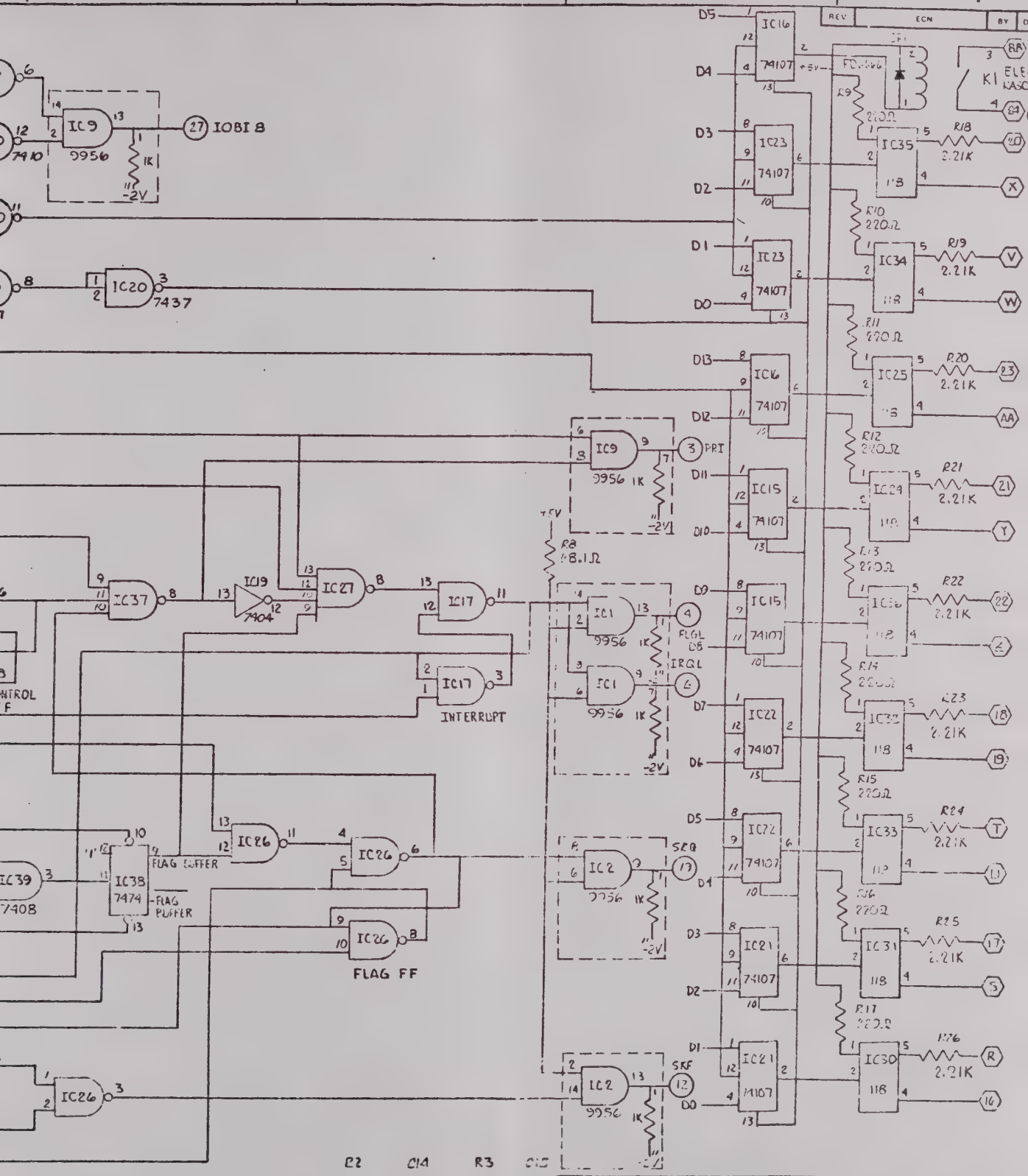


1. ALL UNMARKED RESISTORS ARE 1.5K SIP.

NOTE: UNLESS OTHERWISE SPECIFIED


IC9
9956
1K
-2V
IOBI 8
7410
IC20
7437
IC37
IC19
7404
IC27
IC17
INTERRUPT
IC39
7408
IC38
7474
FLAG BUFFER
FLAG PUFFER
IC26
FLAG FF
IC26
IC1
9956
PRI
FLGL
IRQL
IC2
SRQ
SRF
+5V
-2V
R8
8.1Ω
IC16
74107
IC23
IC6
IC15
IC22
IC21
IC35
IC34
IC25
IC24
IC36
IC32
IC33
IC31
IC30
118
R9
220Ω
R10
220Ω
R11
220Ω
R12
220Ω
R13
220Ω
R14
220Ω
R15
220Ω
R16
220Ω
R17
220Ω
R18
2.21K
R19
2.21K
R20
2.21K
R21
2.21K
R22
2.21K
R23
2.21K
R24
2.21K
R25
2.21K
R26
2.21K
D5
D4
D3
D2
D1
D0
D13
D12
D11
D10
D9
D8
D7
D6
D5
D4
D3
D2
D1
D0
TO J2 (XX) IND WVTK MOLEX PIN
TO J1
LAST FLIP USES C17
C2 C14 R3 C15
SLO 3.01K .01 (10μS) 8.25K
MED 330 .01 (1μS) 825
FAST 330 .005 (.5μS) 1.5K
WAVETEK
SCHEMATIC-
HP 2100 INTERFACE

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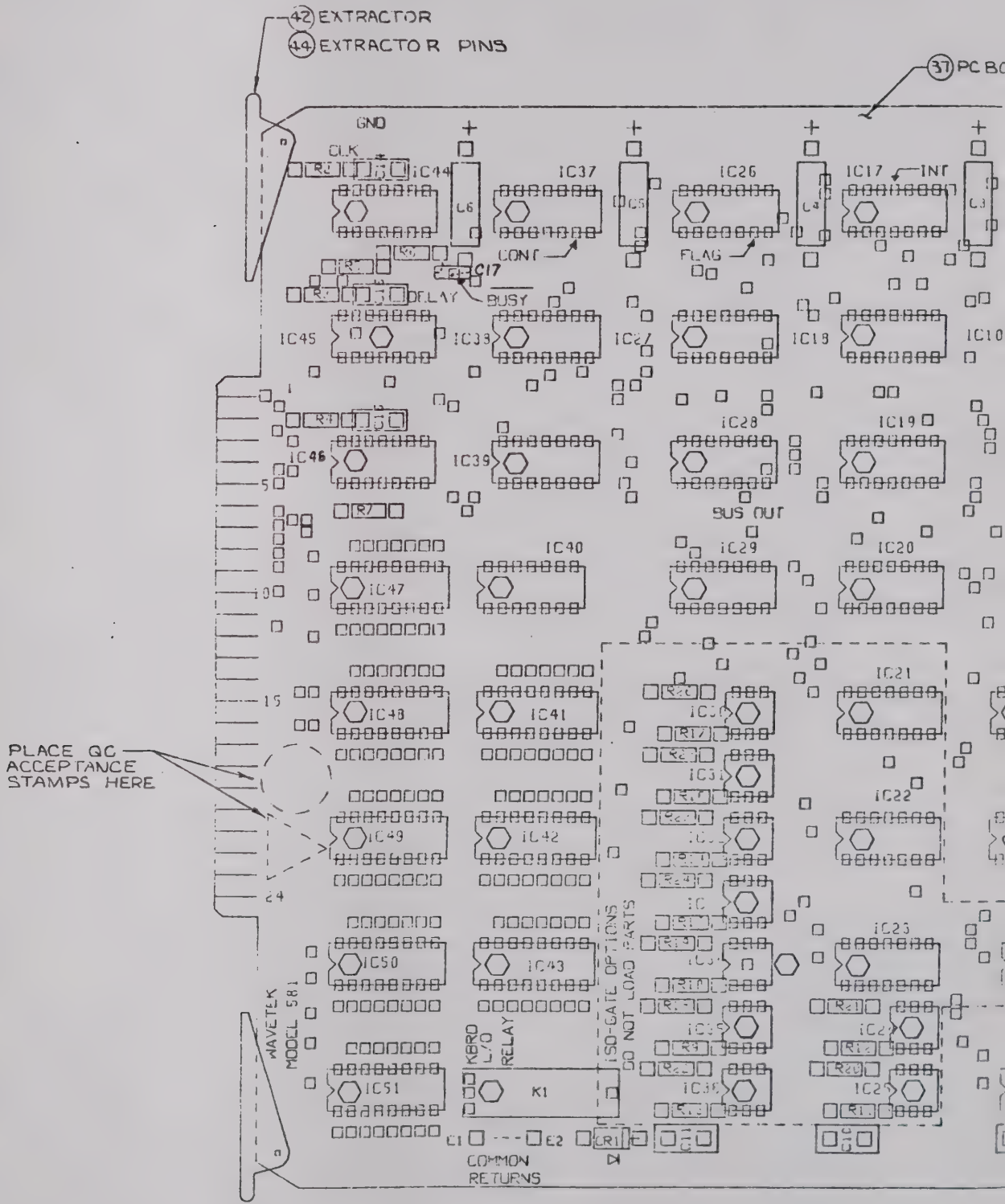
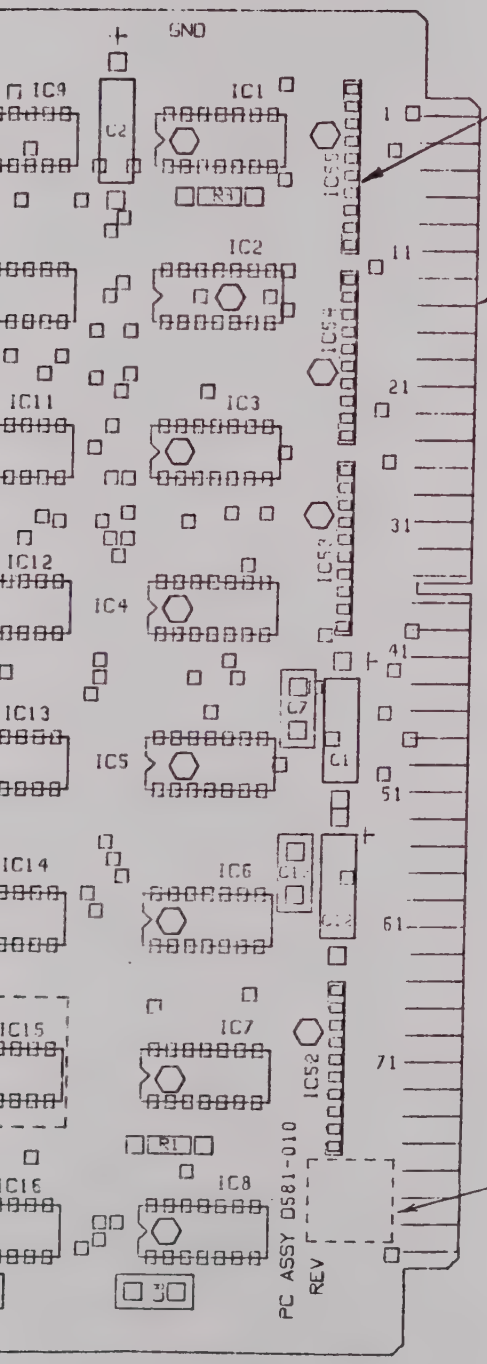


(1)

2.0 ☐☐ NUMBERS IN HEX AND SQUARES INDICATES STATION LOCATION.

NOTE UNLESS OTHERWISE SPECIFIED

1. PROGRAMING MATING CONNECTORS: SEE DRAWING # 1203-00-0434
2. IC. 41 THRU 43 AND 47 THRU 51 NOT USED.
3. INSTALL "CIT" ON GND (TOP ETCH) AT E1 AND BUSY.



IC's 52 THRU 55 ARE: 10 PIN SIP
1.5 K RES. NETWORK: 159-521 (TYP)

CONFORMAL COAT GOLD PLATED TABS TO PREVENT SOLDER ADHEARANCE DURING WAVE SOLDER.

PLACE PCA REV HERE

0581-110-3

REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS

DRAWN ADKINS DATE 10/5/83
ENGINEER [signature] 7-19-
RELEASE APPROVAL [signature] 7/14
TOLERANCE UNLESS OTHERWISE SPECIFIED
XXX ± .010 ANGLES ± 1
XX ± .030
DO NOT SCALE DWG
SCALE 2/1

WAVETEK SAN DIEGO, CALIFORNIA

TITLE
ASSEMBLY
MODEL 581— HP2100
INTERFACE

MODEL NO 581
DWG NO 0101-00-0174
REV C
23338
SHEET 1 OF 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG H/P INTER.	0101-00-0174	WVTK	0101-00-0174	1
NONE	SCHEMATIC H/P INTER.	0103-00-0174	WVTK	0103-00-0174	1
NONE	CABLE ASSY	581-401	WVTK	1203-00-0006	1
C14	CAP,CER,.01MF,50V	CK-103	CRL	1500-01-0310	1
C10 C11 C13 C15 C7 C8 C9	CAP,CER,.1MF,10V	UK10-104	ARCO	1500-01-0412	7
C16	CAP,MICA,30PF,500V	DM15-300J	ARCO	1500-13-0000	1
C1 C12 C2 C3 C4 C5 C6	CAP,TANT,.33MF,10V	150D336X9010B2	SPRAG	1500-73-3601	7
J7	HP2100	581-110	WVTK	1700-00-0174	1
J4	PIN	1480-0116	HP	2800-12-0004	2
J2	EXTRACTOR	5040-1464	HP	3000-00-0010	2
NONE	SOFTWARE,RTE	581-011	WVTK	3000-00-0012	1
NONE	SOFTWARE,BCS	581-012	WVTK	3000-00-0013	1
K1	RELAY,REED,FORM-A	RA3019-1051	PTROL	4500-00-0007	1
R2	RES,MF,1/8W,1%,19.6K	RN55D-1962F	TRW	4701-03-1962	1
R5	RES,MF,1/8W,1%,221	RN55D-2210F	TRW	4701-03-2210	1
R1 R7	RES,MF,1/8W,1%,2.21K	RN55D-2211F	TRW	4701-03-2211	2
R6	RES,MF,1/8W,1%,332	RN55D-3320F	TRW	4701-03-3320	1

WAVETEK
PARTS LIST

TITLE
H/P INTERFACE

ASSEMBLY NO.
1100-00-0174

PAGE: 1

REV
D

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R8	RES,MF,1/8W,1%,68.1	RN55D-68R1F	TRW	4701-03-6819	1
R3	RES,MF,1/8W,1%,7.87K	RN55D-7871F	TRW	4701-03-7871	1
R4	RES,MF,1/8W,1%,9.53K	RN55D-9531F	TRW	4701-03-9531	1
IC52 IC53 IC54 IC55	RES NETWK	785-1R1.5K	BECK	4770-00-0010	4
CR1	DIODE	FD-6666	FAIR	4807-02-6666	1
IC1 IC2 IC9	IC	9560C	FAIR	8000-09-5600	3
IC11 IC12 IC17 IC26 IC4	IC	7400	TI	8000-74-0000	5
IC19 IC40	IC	7404	TI	8000-74-0400	2
IC3 IC39 IC5 IC6 IC7 IC8	IC	7408	TI	8000-74-0800	6
IC10 IC18 IC37	IC	7410	TI	8000-74-1000	3
IC27	IC	7420	TI	8000-74-2000	1
IC20	IC	7437	TI	8000-74-3700	1
IC28 IC29	IC	7438	TI	8000-74-3800	2
IC38	IC	7474	TI	8000-74-7400	1
IC44 IC45 IC46	IC	8601/9601	FAIR	8000-86-0100	3
IC16	IC	74107	TI	8007-41-0700	1
IC15 IC14	IC	74175	TI	8007-41-7500	2

WAVETEK
PARTS LIST

TITLE
H/P INTERFACE

ASSEMBLY NO.
1100-00-0174

REV
D

```
00001                ASMB,L
00002*
00004*
00005  00000          NAM   D.57,0
00006                 ENT   D.57,I.57
00007                 EXT   .BUFR
00008*
00009*
00010*     D.57 - DCS HP-2100 DRIVER FOR WAVETEK MODEL 581 INTERFACE CARD
00011*
00012*     VERSION OF 24 SEPT. 74
00013*
00014*
00015*     DESCRIPTION:
00016*          THE MODEL 581 INTERFACE PROVIDES TWO INTERFACES TO THE
00017*     OUTSIDE WORLD: A DATA BUS ("ASCII BUS"), AND A CONTROL REGISTE
00018*     SEE HARDWARE DOCUMENTATION FOR INTERFACE SPECIFICATIONS.
00019*     STANDARD DCS WRITE REQUESTS ARE PROVIDED TO TRANSFER CHARACTER
00020*     STRINGS TO THE "ASCII BUS", AND TO TRANSFER SINGLE WORDS TO TH
00021*     CONTROL INTERFACE. IN ADDITION, A READ REQUEST ALLOWS THE
00022*     USER TO ACCESS THE STATE OF THE 'BUSY' LINE FROM EXTERNAL
00023*     EQUIPMENT.
00024*
00025*
00026*     USER REQUESTS:
00027*
00028*     WRITE REQUEST:  ( DATA TO ASCII BUSS )
00029*          (P)        JSB    .IOC.
00030*          (P+1)      OCT    020XYY     ( X = 0 FOR ASCII, 1 FOR BINARY,
00031*                                           YY = OCTAL UNIT REF. # )
00032*          (P+2)      JSB OR JMP        ( REJECT ADDRESS)
00033*          (P+3)      DEF               ( BUFFER ADDRESS )
00034*          (P+4)      DEC OR OCT        ( BUFFER LENGTH, > 0 FOR WORDS,
00035*                                           < 0 FOR CHARACTERS )
00036*          (P+5)      - RETURN -
00037*
00038*     THE SPECIFIED NUMBER OF CHARACTERS OR WORDS ARE OUTPUT. A
00039*          BINARY REQUEST OUTPUTS THE LOWER 8 BITS OF EACH WORD.
00040*          ASCII REQUESTS OUTPUT FIRST THE UPPER 8 BITS, FOLLOWED
00041*          BY THE LOWER 8 BITS OF EACH WORD.
00042*
00043*
00044*     WRITE REQUEST:  ( DATA TO CONTROL INTERFACE )
00045*          (P)        JSB    .IOC.
00046*          (P+1)      OCT    021MXX       ( XX = OCTAL UNIT REF. # )
00047*          (P+2)      JSB OR JMP          ( REJECT ADDRESS )
00048*          (P+3)      DEF                 ( OUTPUT WORD )
00049*          (P+4)      DEC    1            ( IGNORED )
00050*          (P+5)      - RETURN -
00051*
00052*     THE CONTROL WORD WHOSE ADDRESS IS AT (P+3) IS OUTPUT TO THE
00053*          CONTROL INTERFACE.
00054*
00055*
00056*     READ REQUEST:  ( BUSY STATUS READ )
00057*          (P)        JSB    .IOC.
```

```
0056*          (P+1)     OCT   0100XX    ( XX = OCTAL UNIT REF. # )
0057*          (P+2)     JSB OR JMP      ( REJECT ADDRESS )
0060*          (P+3)     DEF             ( BUFFER ADDRESS )
0061*          (P+4)     DEC   1         ( COUNT - IGNORED )
0062*          (P+5)     - RETURN -
0063*
0064*     THE INPUT WORD FROM THE INTERFACE IS STORED IN THE WORD WHOSE
0065*          ADDRESS IS AT (P+3). BIT 8 OF THIS WORD IS THE 'BUSY' BIT
0066*
0067*
0070*     CLEAR REQUEST:
0071*          (P)       JSB   .IOC.
0072*          (P+1)     OCT   0000XX      ( XX = OCTAL UNIT REF. # )
0073*          (P+2)     - RETURN -
0074*
0075*     THE CLEAR REQUEST STOPS ANY OUTPUT AND INITIALIZES THE DRIVER.
```

```
0074*
0077*
0076  000000 000000  D.57   NOP
0079  000001 072243R         STA   EQTAD      ADDRESS WORD 1 OF EQT
0080  000002 172222R         STA   EQRTN      SAVE FOR FINAL RETURN TO .BUFR
0081  000003 076245R         STB   REQAD      ADDRESS WORD 2 OF USER REQUEST
0082*
0083  000004 162245R         LDA   REQAD,I    REQUEST WORD 2
0084  000005 072246R         STA   REQST      SAVE
0085  000006 036245R         ISZ   REQAD      SET POINTER TO WORD 4
0086  000007 036245R         ISZ   REQAD       OF USER REQUEST
0087  000010 001700          ALF              FUNCTION TO BITS 3 - 0
0088  000011 012022R         AND   B17        ISOLATE FUNCTON CODE
0089  000012 002003          SZA,RSS          SKIP IF NOT CLEAR REQUEST
0090  000013 026024R         JMP   BSET
0091*
0092  000014 006241R         LDB   BUSY       BUSY FLAG
0093  000015 006003          SZB,RSS          SKIP IF DEVICE IS BUSY
0094  000016 026024R         JMP   BSET
0095*
0096  000017 066023R         LDB   MSIGN      SET B FOR DEVICE BUSY
0097  000020 002404  REJCT CLA,INA           SET A FOR REJECT RETURN
0098  000021 125000R         JMP   D.57,I
0099*
0100  000022 000017  B17    OCT   17
0101  000023 100000  MSIGN  OCT   100000
0102*
0103*
0104  000024 072241R BSET   STA   BUSY       SAVE REQUEST FUNCTION CODE
0105*
0106*
0107*      CONFIGURE THE I/O INSTRUCTIONS
0108*
0109*
0110  000025 162243R         LDA   EQTAD,I    WORD 1 OF EQT ENTRY
0111  000026 012104R         AND   B77        ISOLATE SELECT CODE
0112  000027 032062R         IOR   ILIA       FORM LIA INSTRUCTION
0113  000030 072063R         STA   READ
0114  000031 042144R         ADA   B100       FORM OTA INSTRUCTION
0115  000032 072377R         STA   OTA1
0116  000033 072167R         STA   OTA2
0117  000034 032105R         IOR   B1.1K      FORM  STC  SC,C INSTRUCTIONS
0118  000035 072076R         STA   STCC1
0119  000036 072174R         STA   STCC2
0120  000037 032106R         IOR   B4K        FORM CLC  SC,C INSTRUCTIONS
0121  000040 072100R         STA   CLCC1
0122  000041 072166R         STA   CLCC2
0123  000042 072241R         STA   CLCC3
0124*
0125  000043 036243R         ISZ   EQTAD      ADDRESS WORD 2 OF EQT
0126  000044 162243R         LDA   EQTAD,I    WORD 2 OF EQT ENTRY
0127  000045 012223R         AND   EQMSK      CLEAR AVAILABILITY BITS
0128  000046 172243R         STA   EQTAD,I    SET IN WORD 2 INITIALLY
0129*
0130*
0131*      DECODE THE REQUEST
```

```
0132*
0133*
0134  00147 056241R          LDB   BUSY
0135  00150 006003           SZB,RSS             SKIP IF NOT CLEAR REQUEST
0136  00151 126140R          JMP   CLCC1
0137  00152 056163R          CPB   .1            SKIP IF NOT READ
0138  00153 026163R          JMP   READ
0139  00154 056151R          CPB   .2            SKIP IF NOT WRITE
0140  00155 026167R          JMP   WRITE
0141  00156 006000           CLB                 SET B = 0 FOR ILLEGAL REQUEST
0142  00157 026242R          JMP   REJCT          AND REJECT THE CALL
0143*
0144  00160 000001  .1        DEC   1
0145  00161 000002  .2        DEC   2
0146  00162 102000  ILIA      LIA   0
0147*
0148*
0149*      READ - INPUT A SINGLE WORD FROM THE INTERFACE
0150*
0151*
0152  00163 102000  READ      LIA   0             INPUT WORD
0153  00164 156245R           LDB   REQAD,I       GET BUFFER ADDRESS
0154  00165 170001            STA   B,I           STORE INPUT WORD
0155  00166 026140R           JMP   CLCC1         IMMEDIATE RETURN
0156*
0157*
0158*      WRITE - SETUP POINTERS FOR INTERUPT PROCESSING
0159*
0160*
0161  00167 170001  WRITE     STA   B             SAVE EQT WORD 2
0162  00170 062246R           LDA   REQST         REQUEST CODE
0163  00171 012141R           AND   B1000         GET SETUP BIT
0164  00172 002003           SZA,RSS             SKIP IF SETUP REQUEST
0165  00173 026147R           JMP   NSET          NORMAL WRITE REQUEST
0166*
0167  00174 152245R           LDA   REQAD,I       BUFFER ADDRESS
0168  00175 150002           LDA   A,I           DATA WORD
0169  00176 103700  STCC1     STC   0,C           SET CONTROL FOR DATA TO CONTRO
0170  00177 102500  OTA1      OTA   0             OUTPUT TO CONTROL INTERFACE
0171*
0172  00200 107700  CLCC1     CLC   0,C           CLEAR CONTROL AND FLAG
0173  00201 002400            CLA                 SET A FOR OPERATION INITIATED
0174  00202 072241R           STA   BUSY          CLEAR BUSY IF SETUP REQUEST
0175  00203 126000R           JMP   D.57,I
0176*
0177  00204 000077  B77       OCT   77
0178  00205 001100  B1.1K     OCT   1100
0179  00206 004000  B4K       OCT   4000
0180*
0181*
0182*      SETUP POINTER TO BUFFER
0183*
0184*
0185  00207 152245R NSET      LDA   REQAD,I       USER BUFFER ADDRESS
0186  00210 002006            CLE,ELA             CONVERT TO CHARACTER ADDRESS
0187  00211 072237R           STA   BUFAD
```

```
0188*  - - -
0189*
0190*     SETUP WORD COUNT
0191*
0192*
0193  00112 036245R          ISZ    REQAD       ADDRESS WORD 5 OF REQUEST
0194  00113 162245R          LDA    REQAD,I     USER BUFFER COUNT
0195  00114 002020           SSA                SKIP IF WORDS
0196  00115 026120R          JMP    *+3
0197  00116 001000           ALS                CONVERT TO CHARACTERS
0198  00117 003004           CMA,INA            COMPLEMENT FOR COUNTDOWN
0199  00120 072244R          STA    BFCNT
0200  00121 002003           SZA,RSS            SKIP IF NON-ZERO REQUEST LENGT
0201  00122 026100R          JMP    CLCC1
0202*
0203*
0204*     SET AVAILABILITY FIELD TO BUSY
0205*
0206*
0207  00123 046023R          ADB    MSIGN       SET BIT 15 = 1
0208  00124 176243R          STB    EQTAD,I     SAVE EQT WORD 2
0209*
0210*
0211*     SETUP INCREMENT ( 1 BYTE FOR ASCII, 2 FOR BINARY )
0212*
0213*
0214  00125 006004           CLB,INB            SET ADDRESS/COUNT INCREMENT FO
0215  00126 062246R          LDA    REQST       USER REQUEST WORD
0216  00127 012140R          AND    B100        ASCII/BINARY BIT
0217  00130 002003           SZA,RSS            SKIP IF BINARY
0218  00131 026134R          JMP    *+3
0219  00132 006004           INB                SET INCREMENT FOR BINARY
0220  00133 036237R          ISZ    BUFAD       SET POINTER FOR LOWER BYTE
0221  00134 076244R          STB    INCR        SAVE INCREMENT
0222*
0223*
0224*     CALL CONTINUATOR TO START TRANSFER
0225*
0226*
0227  00135 016142R          JSB    I.57
0228  00136 002400           CLA
0229  00137 126000R          JMP    0.57,I
0230*
0231  00140 000100  B100     OCT    100
0232  00141 001000  B1000    OCT    1000
0233*
0234*
```

```
0292  00201 107703  CLCC3 CLC   0,C        CLEAR CONTROL TO STOP INTERRUP
0293*
0294  00202 062244R        LDB   INCR       INCREMENT: 1 = ASCII, 2 = BINA
0295  00203 104055        CLE,ERB          PUT MODE BIT
0296  00204 005300        RBR               IN BIT 15 OF B
0297*
0298  00205 052243R        ISZ   EQTAD      ADDRESS WORD 3 OF EQT
0299  00206 102245R        LDA   REQAD,I    ORIGINAL BUFFER COUNT
0300  00207 002020        SSA              SKIP IF WORDS
0301  00210 003004        CMA,INA          CHARACTERS = MAKE POSITIVE
0302  00211 040001        ADA   B          ADD MODE BIT
0303  00212 172243R        STA   EQTAD,I    STORE LOG
0304*
0305  00213 002400        CLA
0306  00214 072241R        STA   BUSY       ZERO BUSY FLAG
0307*
0308  00215 062142R        LDA   I.57       RETURN ADDRESS
0309  00216 072221R        STA   RETAD
0310  00217 016224R        JSB   RESTR      RESTORE REGISERS
0311  00220 016001X        JSB   .BUFR      COMPLETION RETURN TO SYSTEM
0312  00221 000000  RETAD NOP
0313  00222 000000  EQRTN NOP
0314*
0315  00223 037777  EQMSK OCT   37777
0316*
0317*
0318*     RESTR - ROUTINE TO RESTORE REGISTERS
0319*
0320*
0321  00224 000000  RESTR NOP
0322  00225 062242R        LDA   EOSAV
0323  00226 106101        CLO
0324  00227 006010        SLA
0325  00230 102101        STO
0326  00231 006006        ELA
0327  00232 052235R        LDA   ASAVE
0328  00233 066236R        LDB   BSAVE
0329  00234 126224R        JMP   RESTR,I
0330*
0331*
0332*     TEMPORARY STORAGE
0333*
0334*
0335  00235 000000  ASAVE NOP
0336  00236 000000  BSAVE NOP
0337  00237 000000  BUFAD NOP
0338  00240 000000  BFCNT NOP
0339  00241 000000  BUSY  NOP
0340  00242 000000  EOSAV NOP
0341  00243 000000  EQTAD NOP
0342  00244 000000  INCR  NOP
0343  00245 000000  REQAD NOP
0344  00246 000000  REQST NOP
0345*
0346*
0347*     DEFINITIONS
```

```
0340*
0342*
0351  00000          A       EQU   0
0351  00001          B       EQU   1
0352*
0353                         END
**  NO ERRORS*
```

MODEL 152
VARIPHASE GENERATOR
(Plus Option 152-005)

Option 005 is the General Purpose Instrument Bus Interface in compliance with IEEE Standard 488-1975 and a proposed IEC standard. Drawings, included in the rear of the manual, are annotated "IEC".

WAVETEK®
9045 Balboa Ave., San Diego, Calif. 92123
P. O. Box 651, San Diego, California 92112
Tel 714/279 2200 TWX 910-335-2007

Model 152 Option -005

The -005 option is an interface between the IEC bus and the 'Wavetek ASCII bus'. The IEC input is supplied to a 24-pin amphenol connector on the rear BNC connector panel. The -005 option also provides optical isolation of input data.

Parts Ordering

P.C. Board	152-135	1 ea.
IC	TIL111	10 ea.
Kit	152-035	1 ea.
Connector, 24-pin female amphenol 'Blue'		1 ea.

Instructions for Modification

1. Modify Mother Bd. as per drawing.
2. Install cable wiring between 24-pin amphenol connector and interface option connector.

R. B. Gould
2-25-76

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP,CER,.01MF,50V	CK-103	CRL	1500-01-0310	12
NONE	CAP,CER,470PF,1KV	DD-471	CRL	1500-04-7111	1
NONE	CAP,TANT,22MF,15V	196D226X9015KA1	SPRAG	1500-72-2601	1
NONE	CAP,TANT,33MF,10V	150D336X901082	SPRAG	1500-73-3601	4
NONE	IEC ISO OPTION BD	152-135	WVTK	1700-00-0679	1
NONE	CONN	57-20240	AMPH	2100-02-0060	1
NONE	JACK SCREW	408-146475	AMPH	2800-23-0008	2
NONE	RES,MF,1/8W,1%,150	RN55D-1500F	TRW	4701-03-1500	9
NONE	RES,MF,1/8W,1%,15K	RN55D-1502F	TRW	4701-03-1502	1
NONE	RES,MF,1/8W,1%,150K	RN55D-1503F	TRW	4701-03-1503	1
NONE	RES,MF,1/8W,1%,221	RN55D-2210F	TRW	4701-03-2210	1
NONE	RES,MF,1/8W,1%,30.1K	RN55D-3012F	TRW	4701-03-3012	1
NONE	RES,MF,1/8W,1%,49.9K	RN55D-4992F	TRW	4701-03-4992	1
NONE	RES,MF,1/8W,1%,6.81K	RN55D-6811F	TRW	4701-03-6811	12
NONE	RES,MF,1/8W,1%,90.9K	RN55D-9092F	TRW	4701-03-9092	9
NONE	RES MODULE	899-1-R6.8K	BECK	4770-00-0003	1
NONE	RESISTOR MOD	159-520	WVTK	4770-00-0005	4
NONE	DIODE	FD-6666	FAIR	4807-02-6666	10

WAVETEK PARTS LIST

TITLE
PCA,IEC ISO OPTION

ASSEMBLY NO.
1100-00-0679

REV
A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	LED	TIL-111	TI	4899-00-0012	10
NONE	SWITCH PC	500-105	DUNCN	5199-00-0001	1
NONE	IC	NE555V	SIG	7000-05-5500	1
NONE	IC	7400	TI	8000-74-0000	1
NONE	IC	7404	TI	8000-74-0400	1
NONE	IC	7405	TI	8000-74-0500	3
NONE	IC	7408	TI	8000-74-0800	1
NONE	IC	7410	TI	8000-74-1000	1
NONE	IC	7430	TI	8000-74-3000	1
NONE	IC	7438	TI	8000-74-3800	7
NONE	IC	7474	TI	8000-74-7400	1
NONE	IC	8242	SIG	8000-82-4200	2
NONE	IC	74107	TI	8007-41-0700	1
NONE	IC	74132	TI	8007-41-3200	4

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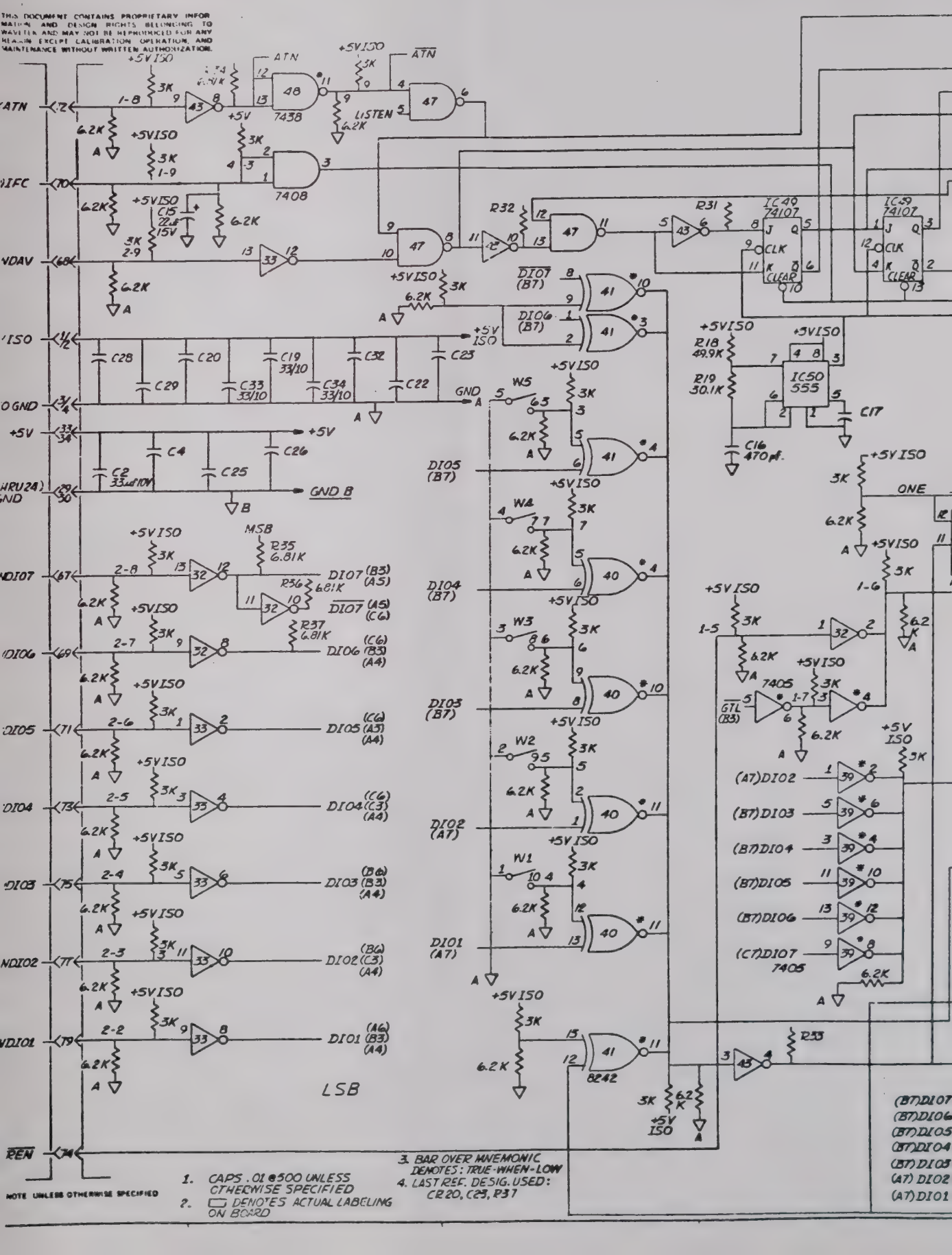

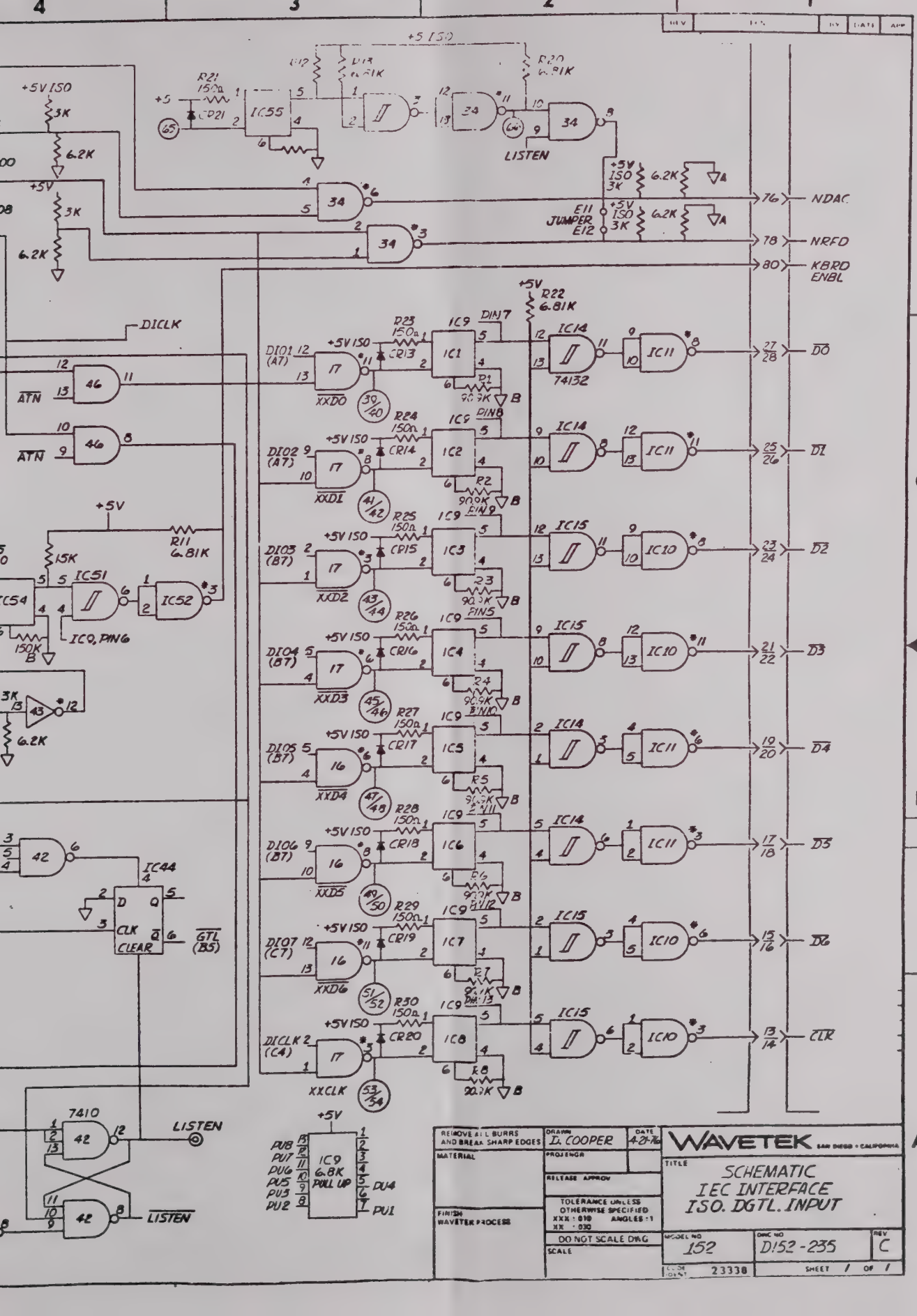
+5 ISO
R21 150Ω
CR21
IC55
R20 6.81K
34
LISTEN
+5V ISO 3K
6.2K
NDAC
E11 JUMPER E12
NRFD
KBRD ENBL
DICLK
ATN
+5V
R22 6.81K
R11 6.81K
15K
IC51
IC52
IC54
IC9, PIN6
IC44
CLEAR
GTL (B5)
7410
LISTEN
IC9 6.8K PULL UP
R23 150Ω
CR13
IC1
DIN7
IC14
74132
IC11
DIO1 (A7)
XXDO
39/40
DO
R24 150Ω
CR14
IC2
PIN8
DIO2 (A7)
XXDI
41/42
D1
R25 150Ω
CR15
IC3
PIN9
DIO3 (B7)
XXD2
43/44
D2
R26 150Ω
CR16
IC4
PIN5
DIO4 (B7)
XXD3
45/46
D3
R27 150Ω
CR17
IC5
PIN10
DIO5 (B7)
XXD4
47/48
D4
R28 150Ω
CR18
IC6
PIN12
DIO6 (B7)
XXD5
49/50
D5
R29 150Ω
CR19
IC7
PIN13
DIO7 (C7)
XXD6
51/52
D6
R30 150Ω
CR20
IC8
DICLK (C4)
XXCLK
53/54
CLR
PU8
PU7
PU6
PU5
PU3
PU2
PU4
PU1
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN D. COOPER
DATE 4-21-76
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO, CALIFORNIA
TITLE
SCHEMATIC IEC INTERFACE ISO. DGTL. INPUT
MODEL NO 152
DWG NO D152-235
REV C
CODE IDENT 23338
SHEET 1 OF 1

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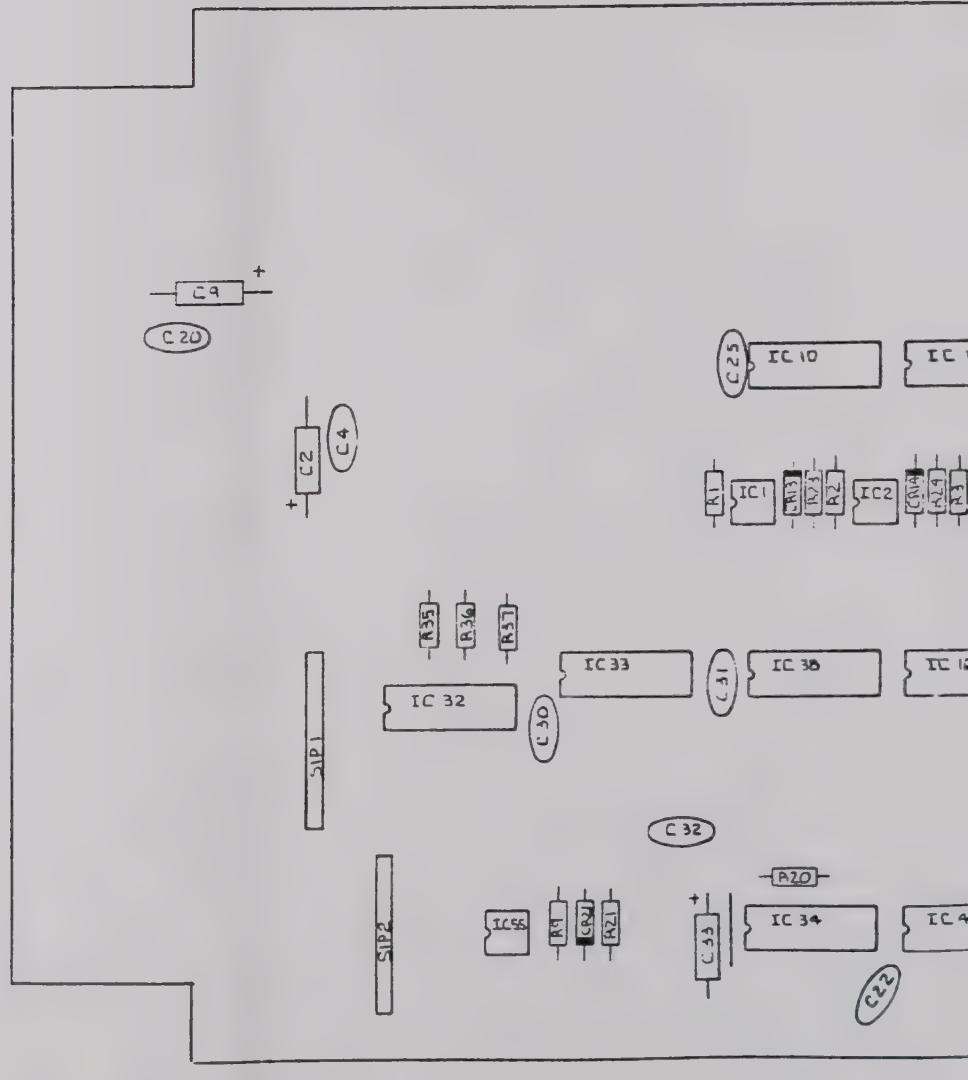
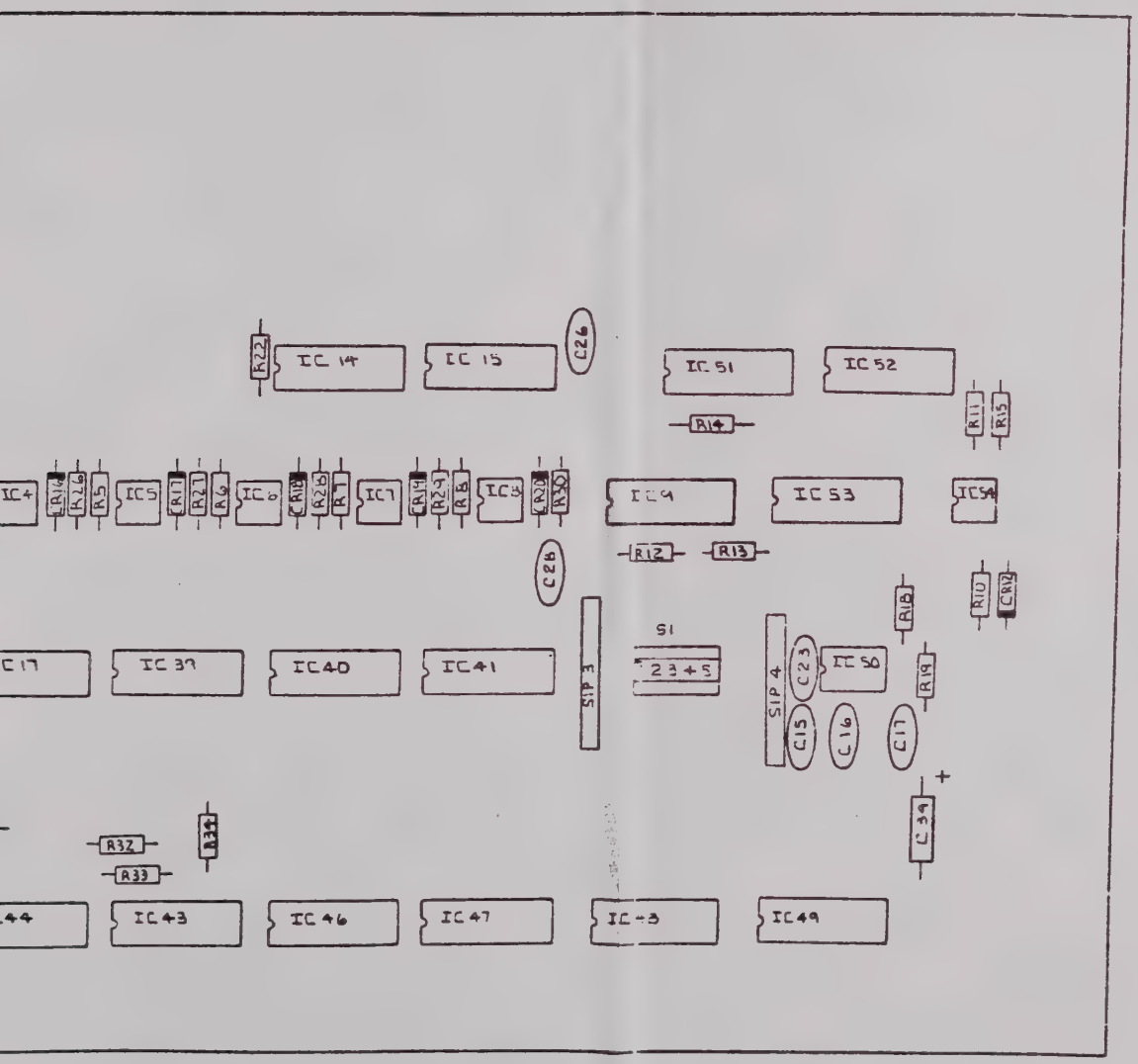


NOTE UNLESS OTHERWISE SPECIFIED



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN RBG	DATE 4/14/76	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE ASSEMBLY IEC & ISO OPTION BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1° XX ± .030		
	DO NOT SCALE DWG		MODEL NO 152 DWG NO D152-C35 REV A
	SCALE 2/1		CODE IDENT 23338 SHEET OF

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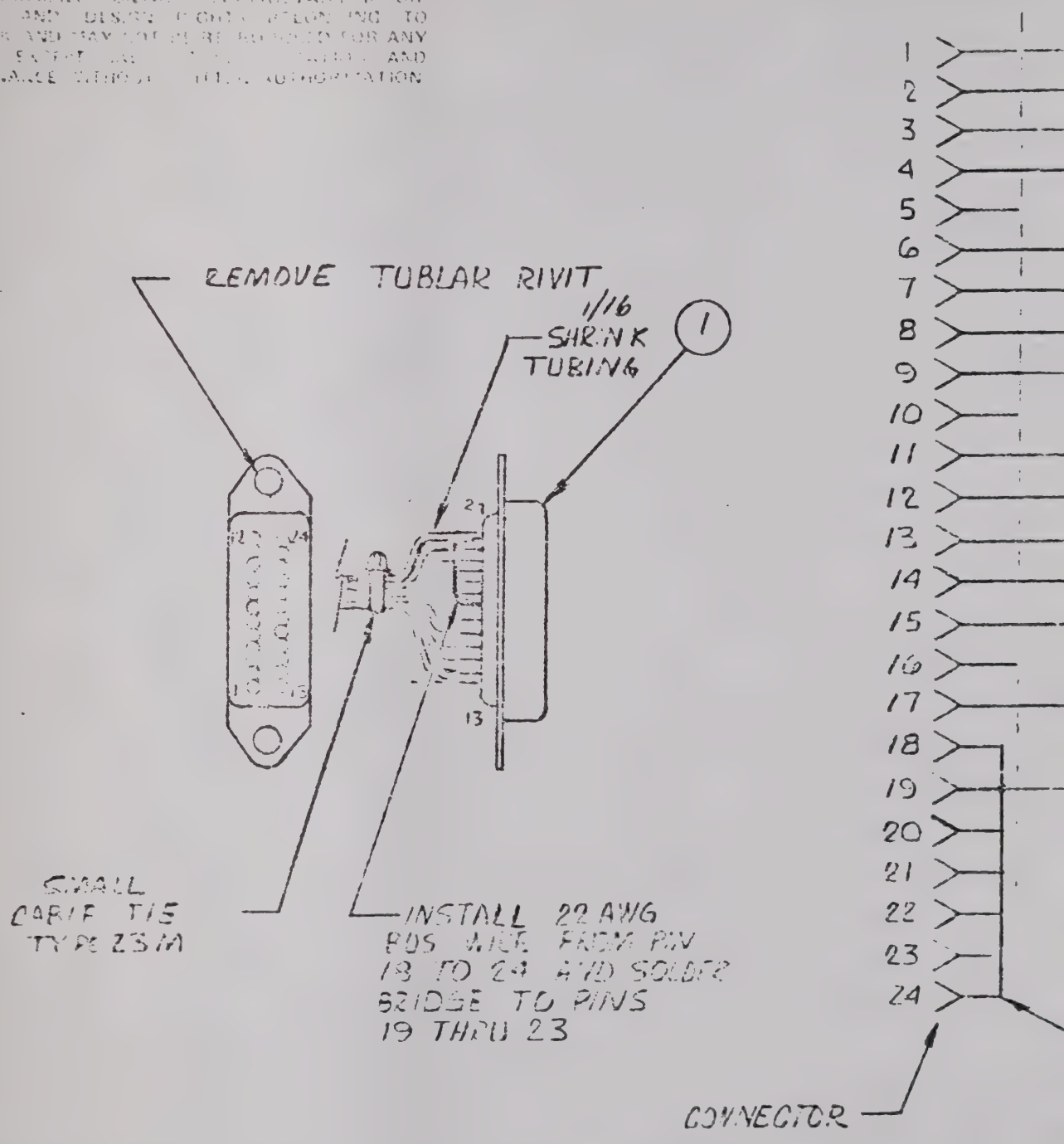
MAINTENANCE MANUAL ... ITS AUTHORIZATION



4. SOLDER WIRES TO CONNECTOR AS SHOWN IN DIAGRAM.
3. CUT WIRES TO A LENGTH OF 5.00.
2. CUT WIRE TO A LENGTH OF 3.50 AND SOLDER TO LUG
1. ○ DENOTES WIRE COLOR PER RESISTOR COLOR CODE

NOTE UNLESS OTHERWISE SPECIFIED

(1)	NDIO1	1
(2)	NDIO2	2
(3)	NDIO3	3
(4)	NDIO+	4
(6)	NDAV	6
(7)	NRFD	7
(8)	NDAC	8
(9)	IFC	9
(11)	NXATN	11
(5) (2) (2)	GND	5
(93)	NDIO5	93
(94)	NDIO6	94
(95)	NDIO7	95
(97)	REN	97
(98)	KBRD ENBL	98
	ISO GND	

IEC OPTION CONNECTION

ERN

OPN

YEL

GRN

VIO

GRY

LINE NO	DESCRIPTION	MFGR	MFGR PN	QTY
2	SOLDER LUG		1414-6	1
1	CONNECTOR	AMPHENOL	57-0340	1

OS WIRE

OVE ALL BURRS & BREAK SHARP EDGES	DRAWN BA	DATE 9-18-85	WAVETEK SAN DIEGO • CALIFORNIA
RIAL	PROJ ENGR		TITLE: CABLE ASSY- IEC OPTION
	RELEASE APPROV		
H ETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO 3152-053 REV
	SCALE FULL	CODE IDENT 23338	SHEET 2 OF 3

MP MASTER
MA35575